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OPERATIONS › PARTS MANUAL

MSP445

Mechancial Super Pro (MSP) Series Riding Trowel

053430; 01/11

allen ENGINEERING CORPORATION

NOTICE

This manual, or a copy of it, must be kept with the machine at all times. There is a manual storage container located on the machine for your convenience.

Riding Trowel

OPERATIONS-PARTS MANUAL

This manual covers the Riding Trowel model listed below:

Part No.	Description
053300	RIDER, MSP445

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Allen® Products are covered under one or more of the following patent numbers:
U.S. Design Patents: 344,736; 400,542; 400,544; 402,998; 402,999; 403,332; 404,041; 404,042; 410,931; 413,127; 416,564; 465,897; 466,909; 474,203.
U.S. Utility Patents: 5,108,220; 5,238,323; 5,328,295; 5,352,063; 5,405,216; 5,476,342; 5,480,257; 5,480,258; 5,533,831; 5,562,361; 5,567,075; 5,613,801; 5,658,089; 5,685,667; 5,803,658; 5,816,739; 5,816,740; 5,890,833; 5,934,823; 5,967,696; 5,988,938; 5,988,939; 6,019,433; 6,019,545; 6,048,130; 6,053,660; 6,089,786; 6,106,193; 6,857,815; 5,288,166; 6,582,153 B1, 7,108,449; 7,114,876; 7,316,523; 7,690,864 B2
Canadian Patents: 2,039,893.
With other Patents Pending.

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Limited Warranty

LIMITED WARRANTY and LIMITATION OF LIABILITY

Allen Engineering Corporation ("Allen") warrants its products to be free of defects in material or workmanship for the following periods:

A. New Machines and Parts ..... One Year
B. New Gear Boxes ..... Two Years

The above listed warranty periods are effective for Allen Machines with a first day of use by End User on April 1, 2007 or later.

Warranty period begins on first day of use by End User. This first day of use is established by the date of a completed Allen Warranty Card or a Bill of Sale to the End User. All warranty is based on the following limited warranty terms and conditions, including the disclaimer of implied warranties and consequential damages.

1. Allen's obligation and liability under this warranty is limited to repairing or replacing parts if, after Allen's inspection, there is determined to be a defect in material or workmanship. Allen reserves the choice to repair or replace.

2. If Allen chooses to replace the part, it will be at no cost to the customer and will be made available to the Allen Distributor, Dealer, or Rental Center from whom the End User purchased the product.

3. Replacement or repair parts, installed in the product, are warranted only for the remainder of warranty period of the product as though they were the original parts.

4. Allen does not warranty engines. Engine warranty claims should be made directly to an authorized factory service center for the particular engine manufacturer.

5. Allen's warranty does not cover the normal maintenance of products or its components (such as engine tune-ups and oil & filter changes). The warranty also does not cover normal wear and tear items (such as belts and consumables).

6. Allen's warranty will be void if it is determined that the defect resulted from operator abuse, failure to perform normal maintenance on the product, modification to product, alterations or repairs made to the product without the written approval of Allen. Allen specifically excludes from warranty any damage to any trowels resulting from an impact to the rotors.

7. Impact damage is not covered under the Allen Gear Box warranty.

8. Allen will pay shop labor on warranty items at the Allen Shop Labor Rate in existence on the date of the warranty claim. An Allen Labor Chart will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.

9. Allen will pay freight on warranty replacement parts at worldwide standard ground rates. No warranty replacement parts will be shipped air freight at the expense of Allen. Allen only pays outbound freight charges when sending warranty replacement parts to the customer via ground service. Allen does not pay any inbound freight. However, if Allen determines this to be a warranted item, only then will Allen reimburse the customer for inbound freight at standard ground rates.

10. ALLEN ENGINEERING CORPORATION'S WARRANTY POLICY WILL NOT COVER THE FOLLOWING: TAXES; SHOP SUPPLIES; ENVIRONMENTAL SURCHARGES; AIR FREIGHT; TRAVEL TIME; LOSS OF TIME; INCONVENIENCE; LOSS OF RENTAL REVENUE; RENTAL COSTS OF EQUIPMENT USED TO REPLACE THE PRODUCT BEING REPAIRED; LOSS OF USE OF THE PRODUCT; COMMERCIAL LOSS; OR ANY OTHER CHARGES WHATSOEVER OR ANY LIABILITIES FOR DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGE OR DELAY.

11. ALLEN ENGINEERING CORPORATION MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THIS LIMITED WARRANTY IS IN LIEU OF THE WARRANTY OF MERCHANTABILITY AND FITNESS. THERE ARE NO OTHER WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THIS DOCUMENT.

12. No Allen employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of Allen Engineering Corporation.

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Information Contained in this Manual

This manual provides information and procedures to safely operate and maintain the Allen Machine.

For your own safety and protection from personal injury, carefully read, understand, and observe the safety instructions described in this manual. Keep this manual or a copy of it with the machine at all times.

Always operate this machine in accordance with the instructions described in this manual. A well maintained piece of equipment will provide many years of trouble free operation.

This manual is divided into the following sections:

SECTION 1 SAFETY

SECTION 2 OPERATIONS

SECTION 3 SERVICE

SECTION 4 PARTS

Complete any warranty requirements as specified by the engine manufacturer in their instructions found inside the manual box located on the back of the riding trowel operator's seat.

Your engine and clutch is not manufactured by Allen Engineering Corporation, Inc, and therefore is not covered under Allen Engineering Corporation, Inc warranty.

Your engine manufacturer should be contacted if you wish to purchase a parts manual or a repair manual for your engine.

Refer to enclosed owners engine manual for complete O&M instructions. See your battery manufacturer for battery warranty.

Dealer Information

Your Dealer has Allen Engineering Corporation trained mechanics and original Allen replacement parts. Always contact the Allen Dealer who sold you this machine for Allen Certified repairs and replacement parts.

Place Allen Dealer information below for future reference.

Dealer Name: _____

Phone #: (____) - ____ - _____

Address: _____

City: _____ **State:**_____ **Zip:**_____

Salesman: _____ **Mobile Phone** _____

Additional Comments: _____

_____

_____

_____

Ordering Parts

Section 4.0 contains illustrated drawings and parts lists for help in ordering replacement parts for your machine. Follow the instructions below when ordering parts to insure prompt and accurate delivery:

1. All orders for service parts - include the serial number for the machine. Shipment will be delayed if this information is not available.

2. Include correct description and part number from the “PARTS” section of this manual.

3. Specify exact shipping instructions, including the preferred routing and complete destination address.

4. **DO NOT** return parts to AEC without receiving written authorization from AEC. All authorized returns must be shipped pre-paid.

5. When placing an order, please contact the AEC dealer nearest you.

NOTE

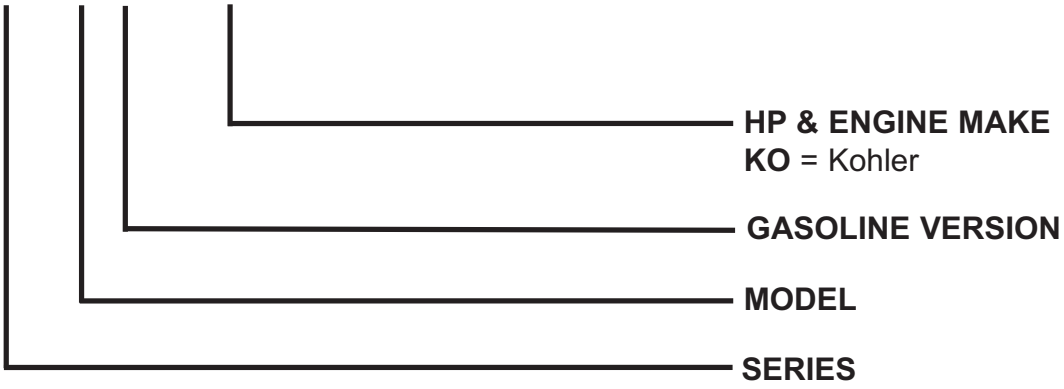
All information, specifications, and illustrations in this manual are subject to change without notice and are based on the latest information at the time of publication.

Model Number - Serial Number Codes

Manufacturer's Codes:

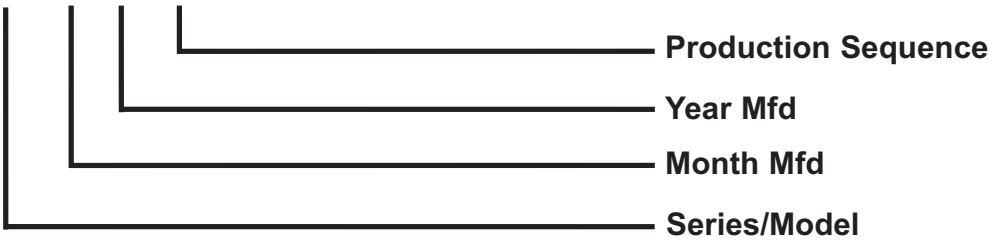
When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine. The legends below specifically defines each significant character or group of characters of the Model Number and Serial Number codes.

Model Number
MSP 44 5 - 40KO



Serial Number
The serial number found on the identification plate is a ten digit format. The model number identifies your machine and will ensure that you receive the correct replacement parts.

445 01 11 001



Unit Identification Plate Location:

An identification plate listing the model number and the serial number is attached to each unit and is located on the rear lower left side of mainframe. Refer to Figure 1 for serial number and model number location. This plate should not be removed at any time.

Please record the information found on this plate below so it will be available should the identification plate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine.

FILL IN FOR FUTURE REFERENCE

Model Number: _____

Serial Number: _____

Date Purchased: _____

Purchased From: _____

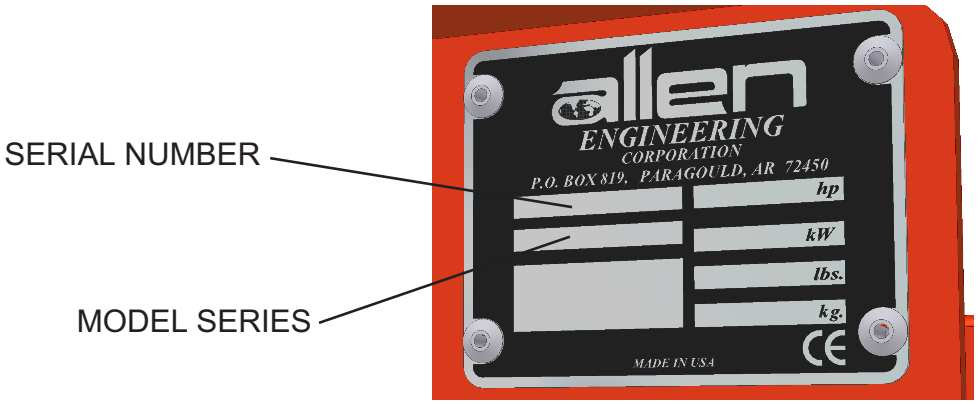


Figure 1
Serial Number Location

Technical Specifications

Measurements in this manual are in U.S. units and their customary metric units (i.e., metric units contained within brackets [8 mm]). The machine RIGHT-HAND and LEFT-HAND sides are determined by sitting on machine (SOM) facing in the direction the machine will travel when going forward.

Machine Features:

- Dimensions - NOL (L x W x H) inch [mm] 101.5x50.5x59.5
  (guardrings/top of seat) . . . . . .[2578.1x1282.7x1511]
- Operating Weight lb [kg] . . . . . .
- Panning Path Width inch [mm] . . . . . .95 [2413]
- Two Rotors (Diameter) inch [mm] . . . . . .46 [1168]
- Rotor Speed (RPM) . . . . . .165 - 170
- Finish Blade (10) inch [mm] . . . . . .6 x 18 [15x45]
- Gearbox (2) . . . . . .Super Heavy Duty (SHD)
- Welded Guard Ring . . . . . .Standard
- Flip-Up Seat Frame . . . . . .Standard
- Operator Control Panel . . . . . .Standard
- Powered Retardant Spray System . . . . . .Standard
- Spray System Capacity gal [L] . . . . . .6 [23]
- Steering System . . . . . .Dual Levers
- Gearbox Rotation . . . . . .Standard
- Battery . . . . . .12 V
- Safety Shutdown Switch . . . . . .Operator Seat
- Fuel Capacity gal [L] . . . . . .6 [23]

- Run Time (Approximate) hr 2.5
- Transmission Type . . . . . .Continual Variable Transmission (CVT)
- Drive Belt Type . . . . . .Kevlar Cogged Vee
- Hour Meter Type . . . . . .Digital Read-out

CE MARKING Compliance:

AEC hereby declares under our sole responsibility that the machine identified within this manual complies with the provisions in accordance with Machinery Directive 98/37/EC. AEC has applied the following normative documents:

- 2000/14/EC; Noise Emission Of Outdoor Equipment Directive
- EN 294:1992; Safety Of Machinery-Safety Distance Of Danger Zones
- EN 574:1996; Safety Of Machinery-Two-hand Control Devices

CE

Engine Specifications

Engine Information

Your MSP445 Riding Trowel mode is equipped with a liquid cooled 40 HP Kohler Gasoline engine. Refer to the applicable engine OEM owner's manual for specific instructions regarding engine operation. This manual is included with the riding trowel at the time of shipping from AEC.

Petrol Engine Features:

Max Power @3600 RPM hp (kW) 40 (29.8)

Displacement cu in (cc) 61 (999)

Bore in (mm) 3.5 (90)

Stroke in (mm) 3.1 (78.5)

Peak Torque @ Maximum lbs ft (Nm) 61.5 (83.4)

Compression Ratio 8.8:1

Dry Weight lbs (kg) 132 (59)

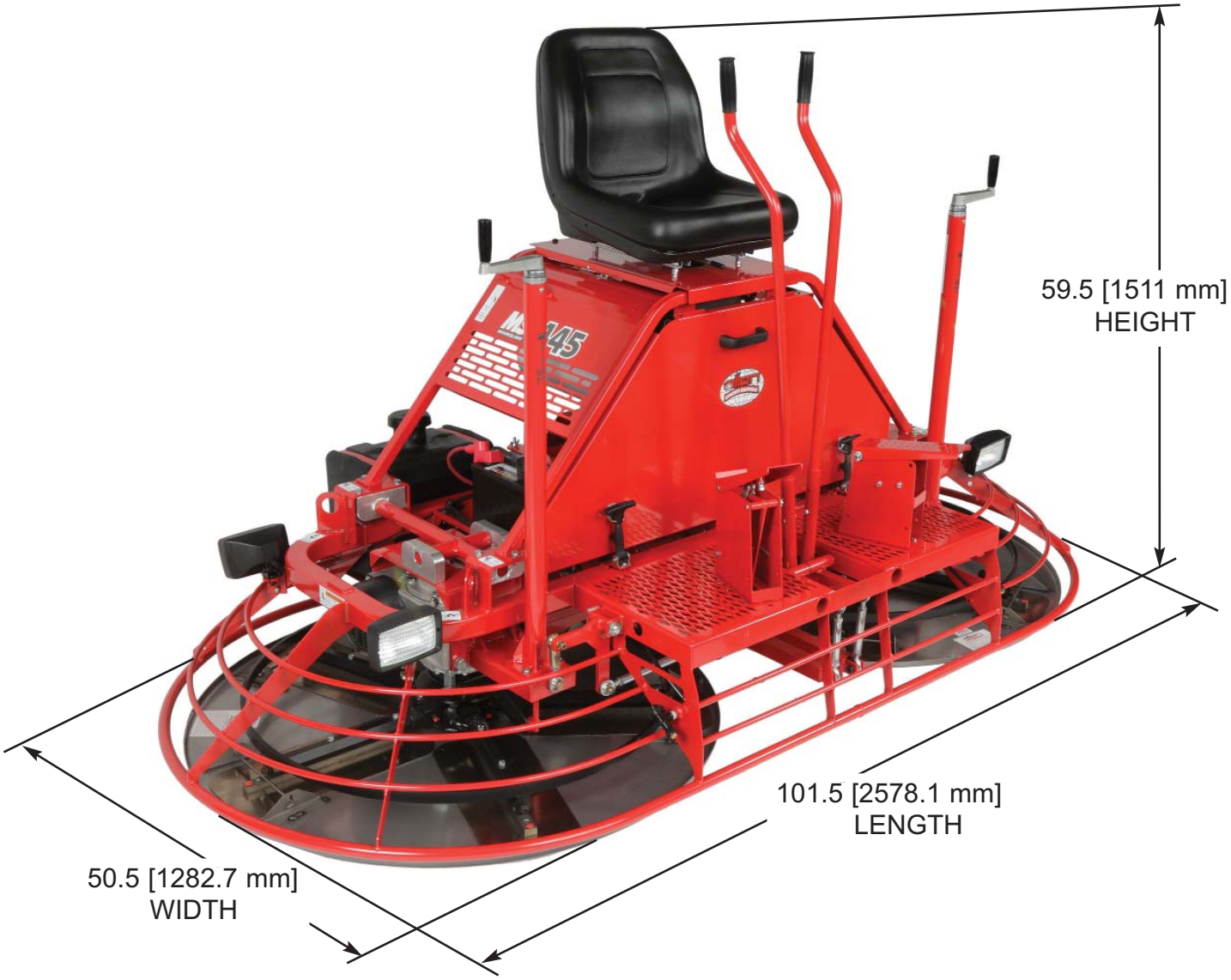
Oil Capacity U.S. quarts (L) 2.9 (2.75)

Lubrication . . . . . .Full pressure w/full-flow filter

Dimensions L x W x H in . . . . . .15.3 x 19.0 x 27.5

Machine Dimensional Specifications

All information, specifications, and illustrations on this page in this manual are subject to change without notice and are based on the latest information at the time of publication.



Sound And Vibration Data

Sound Pressure Level Information:
Sound pressure is "A" weighted . Measured at the operators ear position while the ride-on trowel is operating at full throttle on concrete in a manner most often experienced in “normal ” circumstances. Sound pressure may vary depending upon the condition of the concrete. Hearing protection is always recommended.

Vibration Level Information:
The vibration level indicated is the maximum RMS (Root Mean Square) velocity value obtained at the handle grip while operating the ride-on trowel on curing concrete in a manner most often experienced in “normal ” circumstances. Values were obtained from all three axes of motion. The values shown represent the maximum RMS value from these measurements.

Summary Data Of Sound And Vibration Testing for CE Marking							
Test Machine	Engine Type	Distant Sound Press	Operator Ear SPL	Sound Power Level	Seat Vibration Overall	Foot Vibration Overall	Hand Vibration Maximum
MSP445	Kohler 40 hp	TBD	TBD	TBD	TBD	TBD	TBD
This information was acquired from extensive sound and vibration analysis tests conducted at Allen Engineering Corporation test facilities.							

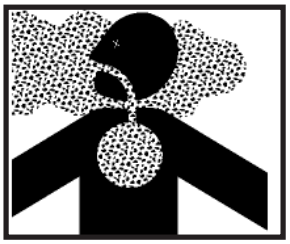
Section 1
SAFETY

State Regulations

⚠ WARNING

CALIFORNIA PROPOSITION 65 WARNING

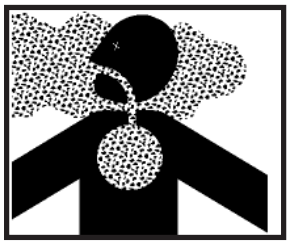
Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.



⚠ WARNING

SILICOSIS WARNING

Grinding/cutting/drilling of masonry, concrete, metal and other materials with silica in their composition may give off dust or mists containing crystalline silica. Silica is a basic component of sand, quartz, brick clay, granite and numerous other minerals and rocks. Repeated and/or substantial inhalation of airborne crystalline silica can cause serious or fatal respiratory diseases, including silicosis. In addition, California and some other authorities have listed respirable crystalline silica as a substance known to cause cancer. When cutting such materials, always follow the respiratory precautions mentioned above.



⚠ WARNING

RESPIRATORY HAZARDS

Grinding/cutting/drilling of masonry, concrete, metal and other materials can generate dust, mists and fumes containing chemicals known to cause serious or fatal injury or illness, such as respiratory disease, cancer, birth defects or other reproductive harm. If you are unfamiliar with the risks associated with the particular process and/or material being cut or the composition of the tool being used, review the material safety data sheet and/or consult your employer, the material manufacturer/supplier, governmental agencies such as OSHA and NIOSH and other sources on hazardous materials. California and some other authorities, for instance, have published lists of substances known to cause cancer, reproductive toxicity, or other harmful effects.

Control dust, mist and fumes at the source where possible. In this regard use good work practices and follow the recommendations of the manufacturers or suppliers, OSHA/NIOSH, and occupational and trade associations. Water should be used for dust suppression when wet cutting is feasible. When the hazards from inhalation of dust, mists and fumes cannot be eliminated, the operator and any bystanders should always wear a respirator approved by NIOSH/MSHA for the materials being used.

1.1 General Safety Precautions

1.1.1 Safety-Alert Signs

This manual contains Safety-Alert Signs, as defined below, which must be followed to reduce the possibility of improper service damage to the equipment or personal injury. Read and follow all Safety-Alert Signs included in this manual.

NOTE defines an operating procedure, condition, etc. which is essential to highlight that contains useful or important information.

EMERGENCY is used for the identification of safety equipment, first aid, or emergency egress locations.

NOTICE used to convey safety information on labels and signs.

CAUTION is indicative of a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Potentially hazardous situations that could result in death or serious injury are indicated by the word WARNING.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

1.2 Spark Arrestor Notice

1.2.1 Laws Pertaining to Spark Arrestors

Some states require that in certain locations arrestors be used on internal combustion engines. A spark arrester is a device designed to prevent the discharge of spark or flames from the engine exhaust. It is often required when operating equipment on forested land to prevent the risk of fires. Consult the engine distributor or local authorities and make sure that you comply with regulations regarding spark arrestors.

1.3 Operating Safety

1.3.1 Operating Safety

⚠WARNING

Familiarity and proper training are required for the safe operation of this equipment! Equipment operated improperly or by untrained personnel can be dangerous! Read the operating instructions contained in both this manual and the engine manual and familiarize yourself with the location and proper use of all controls.

1.3.2 **NEVER** operate this machine in applications for which it is not intended.

1.3.3 **NEVER** allow anyone to operate this equipment without proper training. People operating this equipment must be familiar with the risks and hazards associated with it.

1.3.4 **NEVER** touch the engine or muffler while the engine is on or immediately after it has been turned off. These areas get hot and may cause burns.

1.3.5 **NEVER** use accessories or attachments that are not recommended by AEC. Damage to equipment and injury to the user may result.

1.3.6 **NEVER** operate the machine with the beltguard missing. Exposed drive belt and pulleys create potentially dangerous hazards that can cause serious injuries.

1.3.7 **NEVER** leave machine running unattended.

1.3.8 **DO NOT** run the machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.

1.3.9 **ALWAYS** remain aware of moving parts and keep hands, feet, and loose clothing away from the moving parts of the equipment.

1.3.10 **ALWAYS** keep hands, feet, and loose clothing away from moving parts of the machine.

1.3.11 **ALWAYS** read, understand, and follow procedures in the Operator's Manual before attempting to operate the equipment.

1.3.12 **ALWAYS** be sure operator is familiar with proper safety precautions and operation techniques before using machine.

1.3.13 **ALWAYS** close fuel valve on engines equipped with one when machine is not being operated.

1.3.14 **ALWAYS** store the equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children.

1.3.15 **ALWAYS** operate the machine with all safety devices and guards in place and in working order.

1.4 Engine Safety

1.4.1 Engine Safety

⚠ DANGER

Internal combustion engines present special hazards during operation and fueling. Read and follow the warning instructions in the engine owner's manual and the safety guidelines below. Failure to follow the warnings and safety guidelines could result in severe injury or death.

1.4.2 **DO NOT** run the machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.

1.4.3 **DO NOT** smoke while operating the machine.

1.4.4 **DO NOT** smoke when refueling the engine.

1.4.5 **DO NOT** refuel a hot or running engine.

1.4.6 **DO NOT** refuel the engine near an open flame.

1.4.7 **DO NOT** spill fuel when refueling the engine.

1.4.8 **DO NOT** run the engine near open flames.

1.4.9 **ALWAYS** refill the fuel tank in a well-ventilated area.

1.4.10 **ALWAYS** replace the fuel tank cap after refueling.

1.4.11 **ALWAYS** keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.

1.5.1 Service Safety

⚠ WARNING

Poorly maintained equipment can become a safety hazard! In order for the equipment to operate safely and properly over a long period of time, periodic maintenance and occasional repairs are necessary.

1.5.2 **DO NOT** attempt to clean or service the machine while it is running. Rotating parts can cause severe injury.

1.5.3 **DO NOT** crank a flooded engine with the spark plug removed on gasoline-powered engines. Fuel trapped in the cylinder will squirt out the spark plug opening.

1.5.4 **DO NOT** test for spark on gasoline-powered engines if the engine is flooded or the smell of gasoline is present. A stray spark could ignite the fumes.

1.5.6 **DO NOT** use gasoline or other types of fuels or flammable solvents to clean parts, especially in enclosed areas. Fumes from fuels and solvents can become explosive.

1.5.7 **ALWAYS** turn engine off and remove key from machine before performing maintenance or making repairs.

1.5.8 **ALWAYS** handle blades carefully. The blades can develop sharp edges which can cause serious cuts.

1.5.9 **ALWAYS** keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.

1.5.10 **ALWAYS** replace worn or damaged components with spare parts designed and recommended by AEC Corporation.

1.5.11 **ALWAYS** disconnect the spark plug on machines equipped with gasoline engines, before servicing, to avoid accidental start-up.

1.5.12 **ALWAYS** switch off the power supply at the battery disconnect before adjusting or maintaining the electrical equipment.

1.5.13 **ALWAYS** keep the machine clean and labels legible. Replace all missing and hard-to read labels. Labels provide important operating instructions and warn of dangers and hazards.

1.6 Safety and Operation Labels

The safety and operation labels shown in this section are placed in important areas on the machine to draw attention to potential safety hazards and service information. Should any of these labels become unreadable or damaged, replacement labels can be odered from your distributor.

⚠ CAUTION

This is a multi-purpose label that reqi-ures the operator to have maximum eye, hearing, hand, and feet protection. Also, it highly recommends that the operator reads the manual.

⚠ WARNING

This label identifies the lift locations on the machine. No other locations or features on the machine are to be used as lifting points. This will cause damage to the machine.

NOTE

This label identifies the tank used for retardant spray agents (i.e., water-based retardants) only on the machine. **NO OTHER** non-retardant chemicals nor fuel is to be in this tank.

⚠ CAUTION **⚠ WARNING**

For gasoline-fueled machines, this label identifies the tank used for **GASOLINE** fuel only in the machine. **NO OTHER** type of fuel is to be used in this tank.

WARNING:
EXPLOSIVE FUEL!
DO NOT OVERFILL OR START ENGINE NEAR SPILLED GASOLINE.
LEAVE 1 1/4 INCH SPACE AT TOP OF TANK FOR FUEL EXPANSION.
DO NOT ADD GASOLINE WHILE ENGINE IS HOT OR RUNNING.
DO NOT OPERATE WHILE FUEL CAP IS REMOVED.
ADVERTENCIA:
COMBUSTIBLE EXPLOSIVO!
NO SOBRELLENE NI INCIE EL MOTOR CERCA DE GASOLINA DERRAMADA. DEJE 1 1/4 PULGADAS DE ESPACIO EN LA PARTE SUPERIOR DEL TANQUE PARA EXPANSIÓN DEL COMBUSTIBLE. NO AGREGUE GASOLINA MIENTRAS EL MOTOR ESTÁ CALIENTE O EN MARCHA. NO USAR MIENTRAS LA TAPA DE COMBUSTIBLE NO ESTÉ PUESTA.
DANGER PELIGRO
ENGINES PRODUCE CARBON MONOXIDE WHICH IS AN ODORLESS DEADLY POISON DO NOT OPERATE IN AN ENCLOSED AREA
LOS MOTORES PRODUCEN MONÓXIDO DE CARBONO QUE ES UN VENENO MORTAL SIN OLOR. NO HAGA FUNCIONAR EN UN ÁREA CERRADA
GASOLINE ONLY
GASOLINA SOLAMENTE

NOTE

This label is a maintenance reminder to grease the thrust bearing daily. This will ensure that the life span of the bearings will be maintained at their optimal preformance level.

⚠ CAUTION

This label cautions against allowing cleaning agents, surface treatments, or other foreign substances to contaminate drive components.

The drive components could be damaged from the contamintates and cause the drive system to fail.

CAUTION
DO NOT ALLOW CLEANING AGENTS, SURFACE TREATMENTS, OR FOREIGN SUBSTANCES TO CONTAMINATE DRIVE COMPONENTS
DRIVE COMPONENTS COULD BE DAMAGED AND CAUSE THE DRIVE SYSTEM TO FAIL
047878

⚠ WARNING

This label warns against using **safety clip** pans when lifting machines overhead. **Safety Catch** pans must be used to prevent injury or death.

WARNING ADVERTENCIA
Lifting/Crush Hazard
Use SAFETY CATCH pans only when lifting overhead.
Elevación/Peligro de Aplastamiento
Utilice sartenes CAPTURA DE SEGURIDAD sólo al levantar cabeza.

⚠ CAUTION

This label cautions against hot surfaces. To prevent serious burns, avoid touching these surfaces.

1.6, continued
Safety and Operation Labels

⚠ WARNING

This label warns of the risk hazards associated with engine exhaust fumes causing heath issues as identified by the State of California.

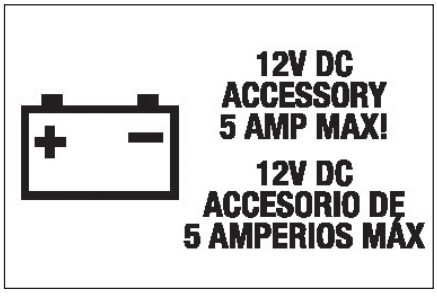
WARNING
ADVERTENCIA
CALIFORNIA PROPOSITION 65 WARNING
Engine exhaust and some of its constituents contain chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.
ALWAYS work in a well ventilated area and use approved safety equipment.
ADVERTENCIA DE PROPISICIÓN 65 DE CALIFORNIA
Escape del motor y algunos de sus componentes contienen productos químicos conocidos en el Estado de California como causantes de cáncer, defectos congénitos y otros daños reproductivos.
SIEMPRE trabaje en un área bien ventilada y use equipos de seguridad aprobados.

This label states that this equipment was proudly manufactured in the United States of America.

⚠ CAUTION

This label cautions the operator of pinch points on the machine. Most appropriately around the lifting points.

This label points out the accessory port location on the machine and cautions not to use anything over 5 amps.



Section 2
OPERATIONS

SECTION 2
OPERATIONS

NOTE

This machine is built with user safety in mind. However, it can present hazards if improperly operated and serviced. Follow operating instructions carefully.

If you have any questions about operating or servicing this equipment, please contact your Allen Engineering Dealer or AEC Customer Service at 800-643-0095 or 870-236-7751.

2.1.1 Description

The ***MSP445*** riding trowel is a modern high production machine. Finishing rate will vary depending on the operators skill and job conditions. This riding trowel has ten finishing blades.

The Super Heavy Duty (SHD) Gearboxes are designed to provide exceptional performance with low maintenance and trouble free use under some of the worst conditions.

All Allen Engineering ***MSP445 Riders*** are equipped with a safety shutdown switch and a low oil warning for added job safety and engine protection.

Operating time between fuel refills is approximately 2-1/2 to 3 hours with a rotor speeds of 65 to 170 RPM.

The ***MSP445 Riders*** are the most technically advanced riding trowels on the market today. With proper maintenance and use, your riding trowel will provide you with exceptional service and dependability.

2.2 Start Up Procedures

2.9.1 Before Starting Procedures

Before starting the riding trowel check for the following:

1) Oil level in engine.

2) Oil level in riding trowel gearboxes.

3) Fuel level in fuel tank.

4) Condition of air filter on engine.

5) Condition of riding trowel arms and blades.

6) Verify that daily maintenance of grease points have been performed.

2.9.2 Starting Procedures

Before starting riding trowel, refer to Figure 2.2.1 and Figure 2.2.2 for location and identification of operational and visual controls pertaining to the operation of the riding trowel.

1) Sit down correctly on the riding trowel seat. **DO NOT** attempt to start the riding trowel without an operator in the seat.

2) If engine is cold, pull out the choke lever located in the control zone (refer to Figure 2.2.1). Press down on throttle pedal (located by the operator's right foot) one to two times.

NOTE

To much throttle during start-up will flood the engine.

3) Turn igintion switch key to the start-position, immediately release key when engine starts. If after two or three attempts the engine has not started push in choke. Attempt to start trowel again. Allow engine to warm up for 5 minutes before operating riding trowel.

⚠ CAUTION

Operating the starter for more than 5 seconds can damage the starter or engine. If engine fails to start release the switch and wait 15 seconds before operating starter again.

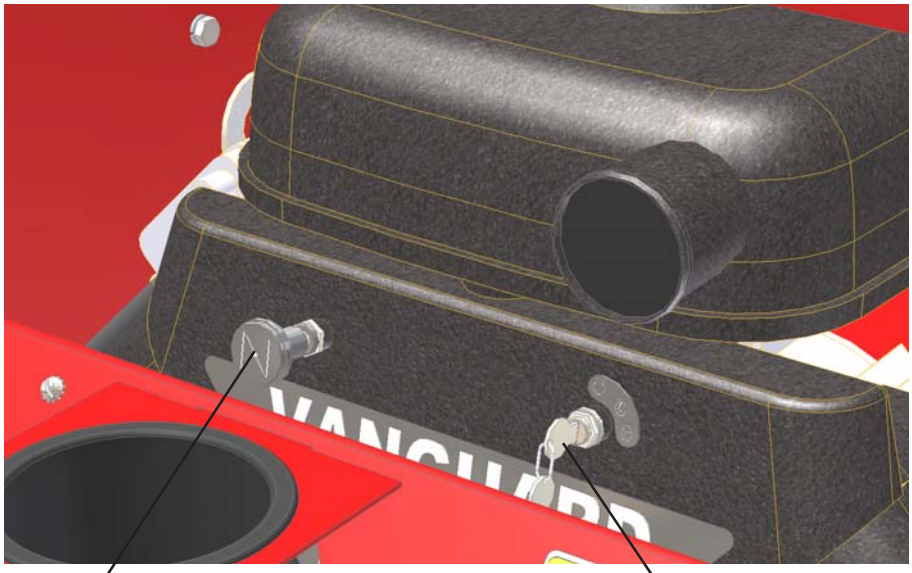


FIGURE 2.2.1
TOP VIEW OF CONTROLS

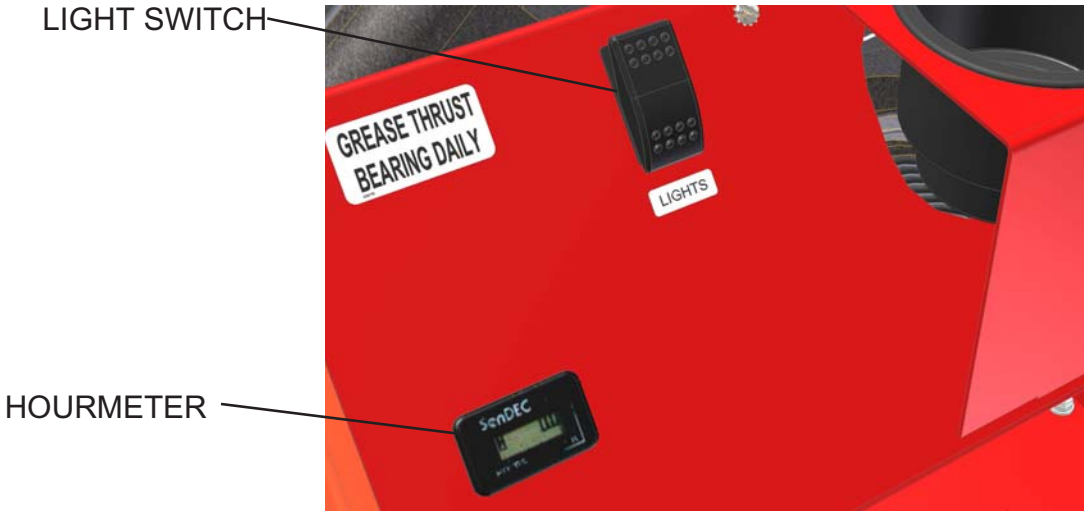


FIGURE 2.2.2
FRONT VIEW OF CONTROLS

2.3 Operating Instructions

2.3.1 Operating The Riding Trowel

To utilize your Allen Engineering ***MSP445 Rider*** to its fullest capacity the machine should be driven in the direction the operator is facing. This will finish the widest possible area while giving the operator an excellent view of the slab surface about to be troweled. When the machine reaches the end of the slab make a 180 degree turn and repeat the straight line of direction to the other end of the slab. To familiarize a new operator with the riding trowel the following steps should be taken.

NOTE

*All items in this manual are described from the operator Sitting On Machine or **SOM** for short.*

1) Location of all Operating Controls

[A] Right Pitch Control
[B] Joystick (Forward & Reverse)
[C] Joystick (Left & Right, Forward & Reverse)
[D] Left Pitch Control
[E] Right Foot Pedal
[F] Left Kill Switch
[G] Seat Adjustment
[H] Cup Holder

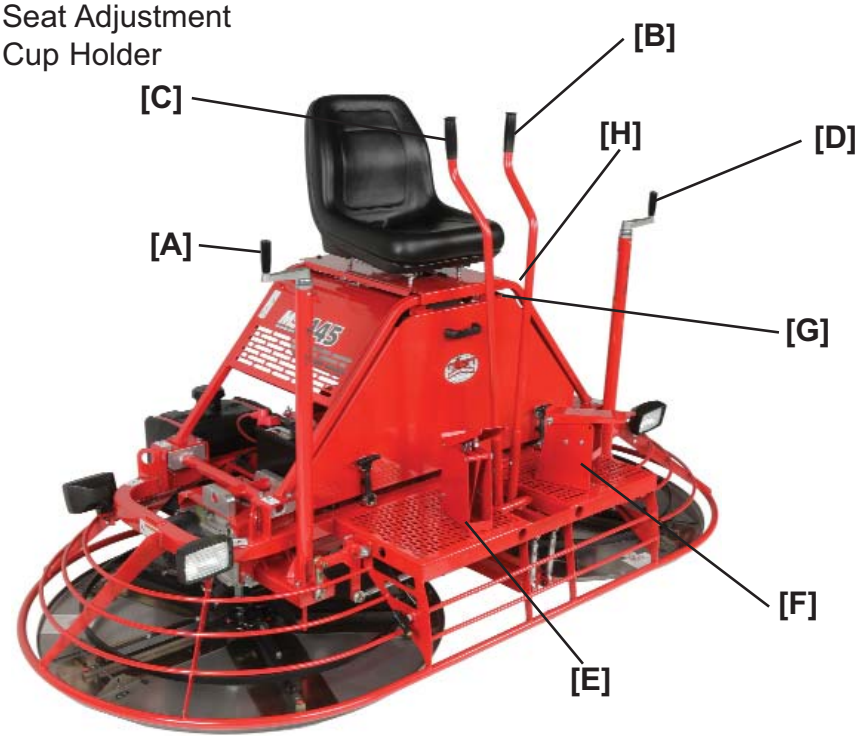


FIGURE 2.3.1
Operations Control Components

2) With the operator in the seat, show him the functions of the joysticks **[B]** and **[C]** and how to start the machine. Refer to Figure 2.3.1.

A hard level concrete slab with water on the surface is an ideal place for an operator to practice with the machine. For practice pitch the blades up approximately 1/4 inch on the trailing edge. Start by making the machine hover in one spot and then practice driving the machine in a straight line and making 180 degree turns. Best control is achieved at full engine RPM.

⚠ CAUTION

After starting engine fully engage the throttle. This allows the engine to warm up quicker and also engages the torque converter. At this time the machine's rotors will begin turning.

⚠ CAUTION

***DO NOT** use excessive pressure on the joysticks. Excessive pressure does not increase the reaction time of the machine and can damage steering controls.*

2.3.2 Stopping The Riding Trowel

To stop the trowel's movement, let go of the joysticks **[B]** and **[C]**. They will return to their neutral position. Also release pressure on the right foot pedal **[E]**.

⚠ CAUTION

New to this machine is the seat kill switch mechanism. If in need of an emergency stop, simply turning the key off or raising off the seat while holding the right foot pedal down, will stop the engine from running.

2.3, continued
Operating Instructions

2.3.3 Steering The Riding Trowel

A slight "feathering motion" forward and backward with the left hand joystick is required to move the machine in a straight path to the left or right while operating the right hand joystick. Refer to Figure 2.3.3..

Position	Action
1	Forward
2	Reverse
3	Rotate clockwise
4	Rotate counter clockwise
5	Left sideways
6	Right sideways

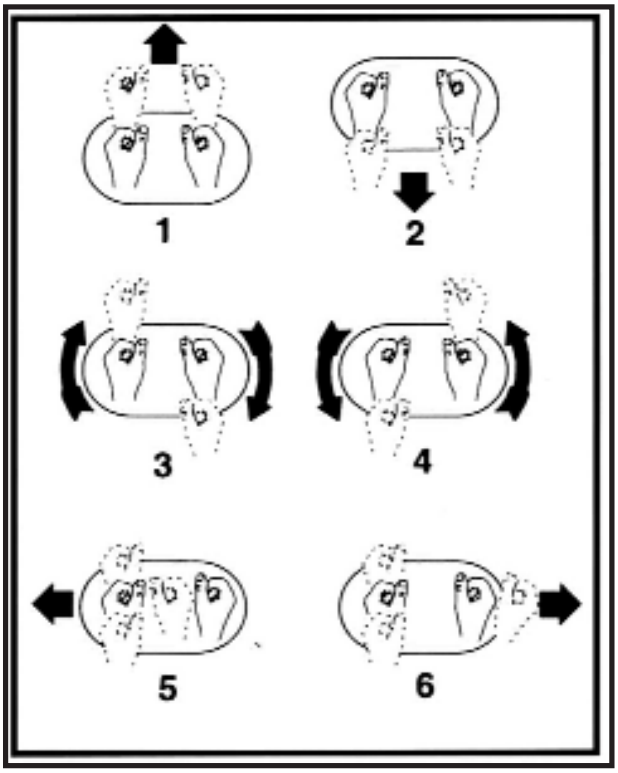


FIGURE 2.3.3
Steering Control Diagram

2.3.4 Pitch Adjustment

Different pitch angles are needed as you work the different stages of the concrete. Refer to Figure 2.3.4 table below. When changing or setting pitch (angle of trowel blades), slow the machine down, set the desired degree of pitch on the left side of the machine and then adjust the right side to match.

To increase the pitch, turn the pitch control clockwise "**a**" use the pitch indicator "**b**" to adjust pitch equally on both right and left trowel blades.

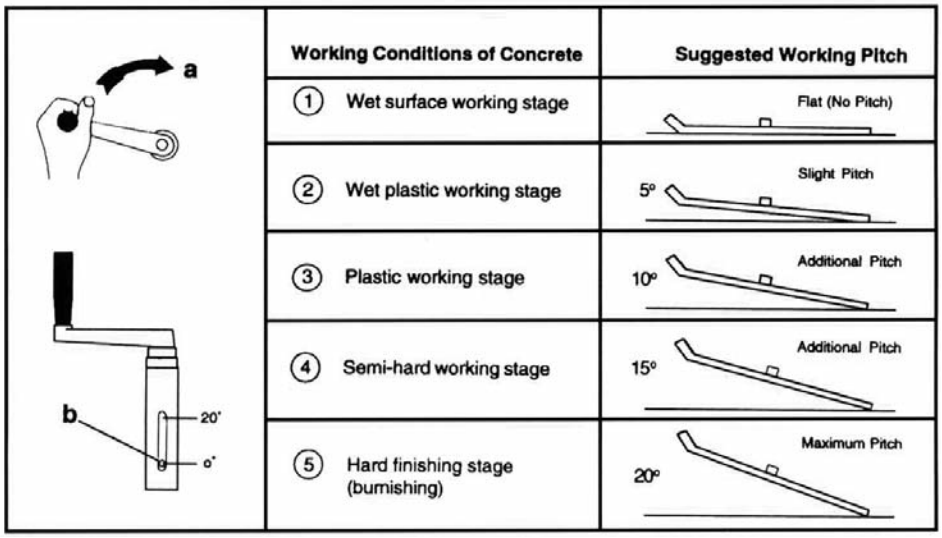


FIGURE 2.3.4
Pitch Adjustment

Notes

Section 3
SERVICE

3.1 Periodic Maintenance

3.1 Periodic Maintenance Schedule

The table below list basic trowel and engine maintenance. Refer to OEM engine manufacturer's Operation Manual for additional information on engine maintenance. A copy of the engine operator's manual was supplied with the machine when it was shipped. To service the engine pull the seat locking pin out and tilt seat back.

TABLE 3.1.1
CHECK LIST

ITEM	DAILY	EVERY 20 HRS	EVERY 50 HRS	EVERY 100 HRS	EVERY 300 HRS
Grease towel arms	✓				
Check oil level in gearbox	✓				
Check engine oil level	✓				
Inspect air filter, replace if required	✓				
Check & tighten external hardware	✓				
Check drive belt for wear		✓			
Check valve clearance					✓
Change engine oil				✓	
Replace engine oil filter				✓	
Grease trowel gearbox					✓
Replace spark plug					✓
Replace Polycarbon Bearing on Steering and Crosshead Components					✓

3.2 Trowel Gearbox Maintenance

Check Oil levels in the gearbox daily (every 8 hours) Add oil if oil level is below the check sight glass.

1) To add oil tilt trowel back and remove the fill plug. Add oil through hole opening. Replace fill plug after proper level has been achieved. **DO NOT** fill past the fill plug hole opening. Use Allen Mobil Oil SHC 634, synthetic ISO VG 460.

2) Each Gearbox has a grease fitting on top cover that must be greased (2 SHOTS ONLY) every 300 operating hours. Use only Mobilith SHC 220 Extended pressure grease.

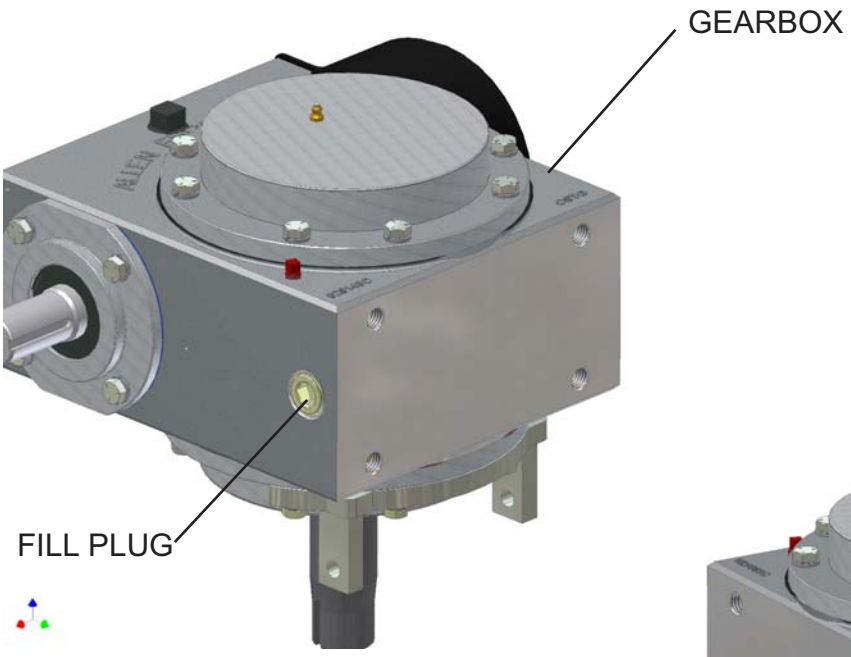


FIGURE 3.2.1
FILL PLUG LOCATION

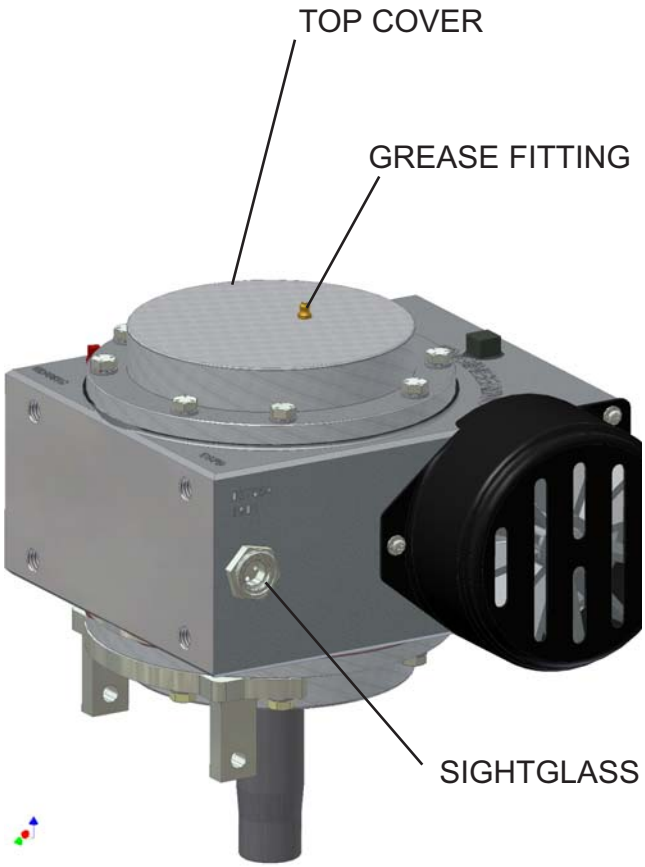


FIGURE 3.2.2
GREASE FITTING LOCATION

3.3 Drive Belt

3.3.0 Drive Belt Maintenance

⚠ CAUTION

The drive belts MUST be free from oil and foreign contaminants to prolong life.

3.3.1 To Replace The Drive Belt:

1) The MSP445 is equipped with a spare belt located inside the belt guard.

2) Place the trowel on a flat, level surface with the blades pitched flat.

3) Disconnect the battery. Refer to Figure 3.3.1.

4) Use a M6x1.0x40 mm bolt to spread apart the pulleys to allow slack in the belt and remove it from the lower and upper pulleys. Refer ti Figure 3.3.3.

5) Replace new belt in opposite order of removal.

6) Reconnect the battery.

3.3.2 To Add Drive Belt:

1) Place the trowel on a flat, level surface with the blades pitched flat.

2) Disconnect the battery. Refer to Figure 3.3.1.

3) Remove battery and plate assembly by removing (4) 5/16-18 x 1 bolts. Refer to Figure 3.3.1

4) Disconnect and remove u-joint assembly by removing (4X) 1/4-20x3/4 socket head round screws and 1/4 split lock washers on the driveshaft hub closest to driven pulley. Refer to Figure 3.3.2.

5) Apply one drop of blue Loctite No. 242 to the (4X) 1/4-20x3/4 socket head round screws and reassemble with 1/4 split lock washers in opposite order of disassembly.

6) Install battery plate assembly with one drop blue Loctite No. 242 on the 5/16-18 x 1 bolts.

7) Reconnect the battery.

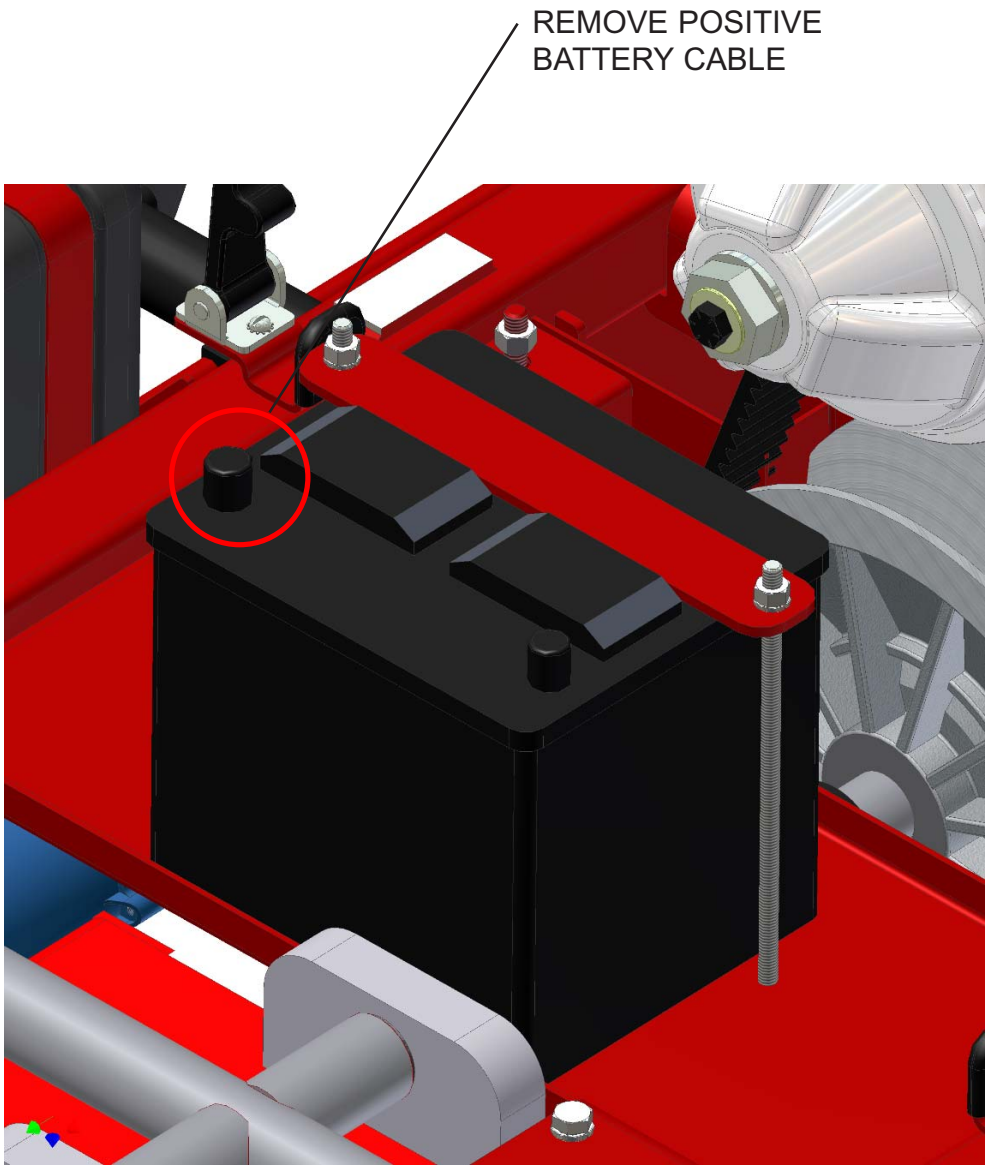


FIGURE 3.3.1
BATTERY DISCONNECT

3.3, continued
Drive Belt

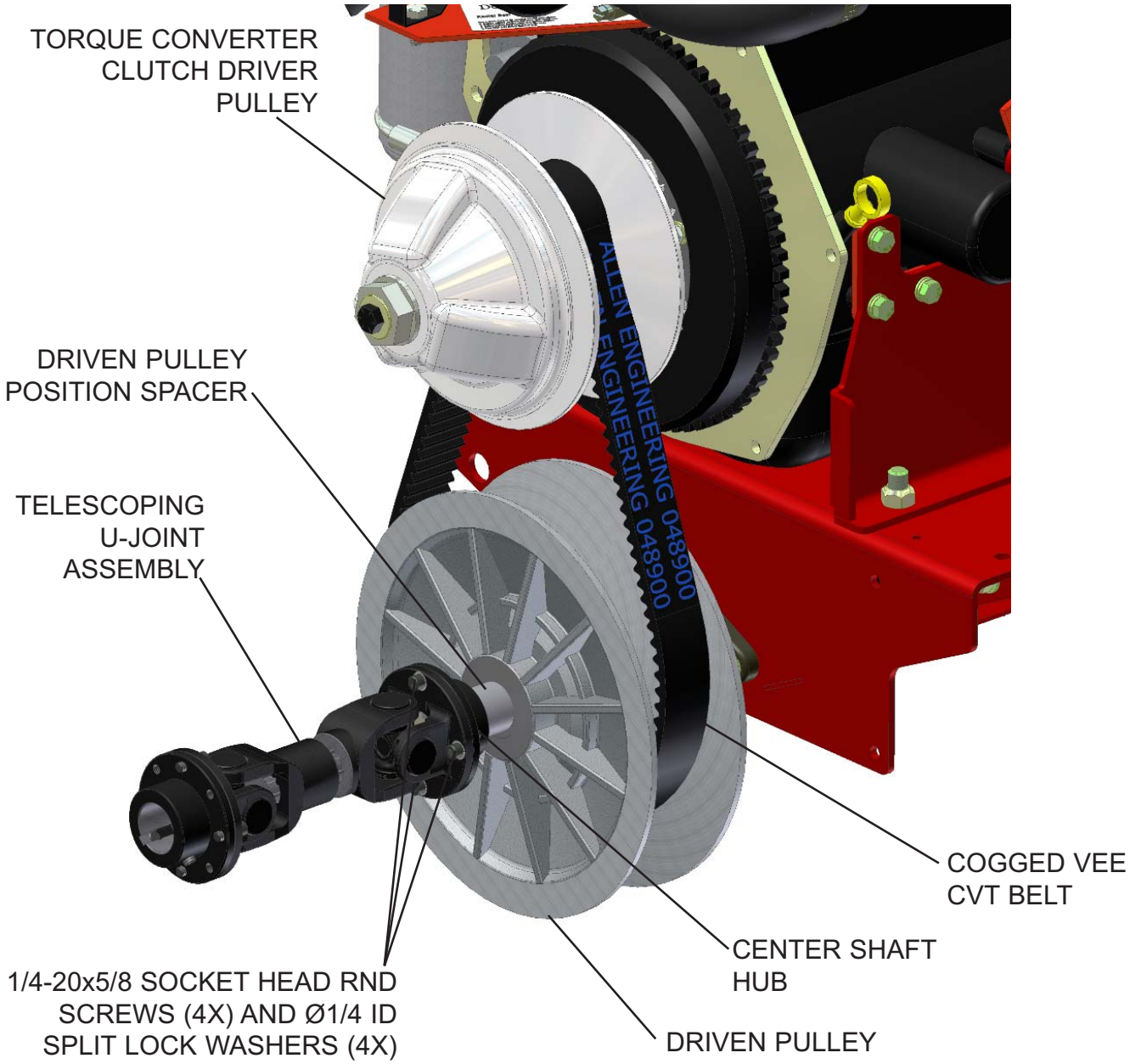

TORQUE CONVERTER CLUTCH DRIVER PULLEY
DRIVEN PULLEY POSITION SPACER
TELESCOPING U-JOINT ASSEMBLY
1/4-20x5/8 SOCKET HEAD RND SCREWS (4X) AND Ø1/4 ID SPLIT LOCK WASHERS (4X)
COGGED VEE CVT BELT
CENTER SHAFT HUB
DRIVEN PULLEY
ALLEN ENGINEERING 048900

FIGURE 3.3.2
BELT REMOVAL

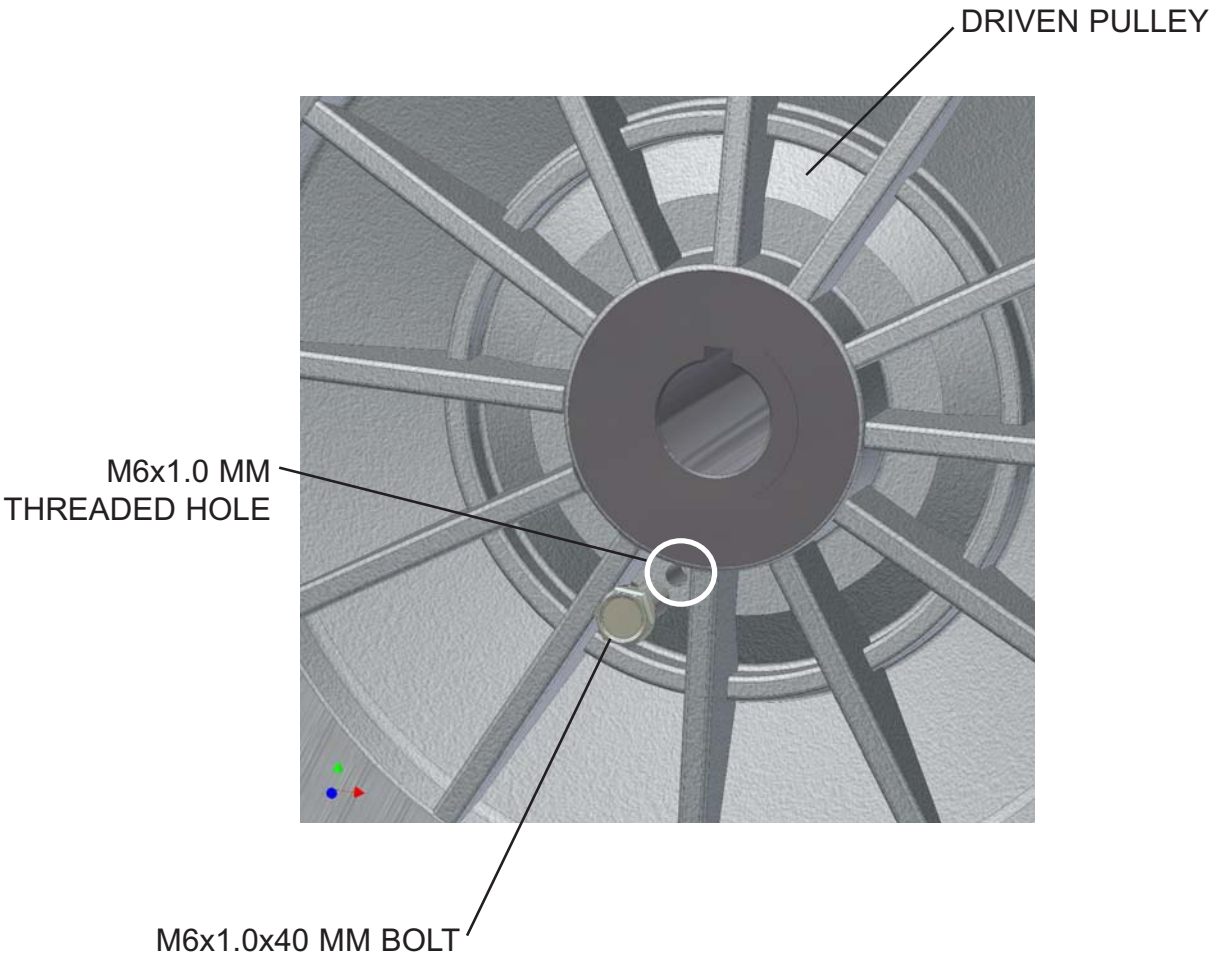


FIGURE 3.3.3
PULLEY SEPARATION

3.4 Control Lever Adjustment

3.4 Control Lever Adjustment Procedure

Be sure that the trowel is on a level surface. The control levers should line up evenly. If levers appear out of adjustment they can be re-adjusted forward or backwards as follows:

NOTE

Trowel must be placed on flat level surface that fully supports the blades on both rotors.

1) Remove bolts and nuts **[A]**.

2) Remove jam nuts **[B]**.

3) Extend linkage to adjust control levers backward.

4) Shorten linkage to adjust linkage control levers forward.

5) After levers have been adjusted to the desired position, reassemble bolts and nuts **[A]** and tighten jam nuts **[B]**.

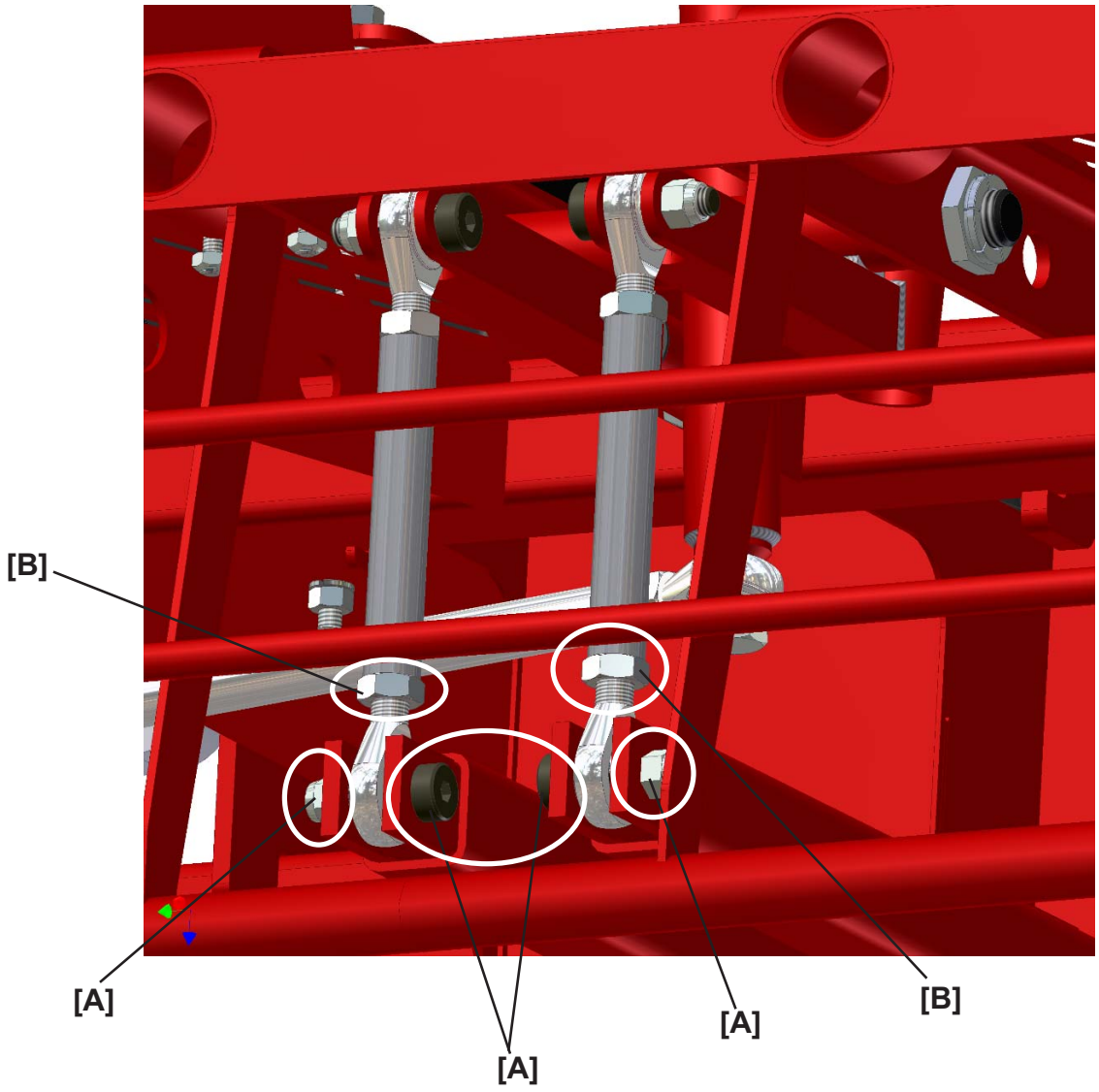


FIGURE 3.4.1
CONTROL LEVER ADJUSTMENT

3.5 Right Hand Control Lever Adjust

3.5 RH Control Lever Adjustment Right Or Left Procedure

The right hand lever should be set to the same angle as that of the left to form a "V". If levers become out of adjustment adjust the right hand lever as follows:

1) Remove jam nuts **[D]**.

2) Remove bolt **[C]**.

3) Extend linkage to move control levers to the right .

4) Shorten linkage to move control levers to the left.

5) After control lever has been adjusted to the desired position reassemble bolt **[C]** and tighten jam nuts **[D]**.

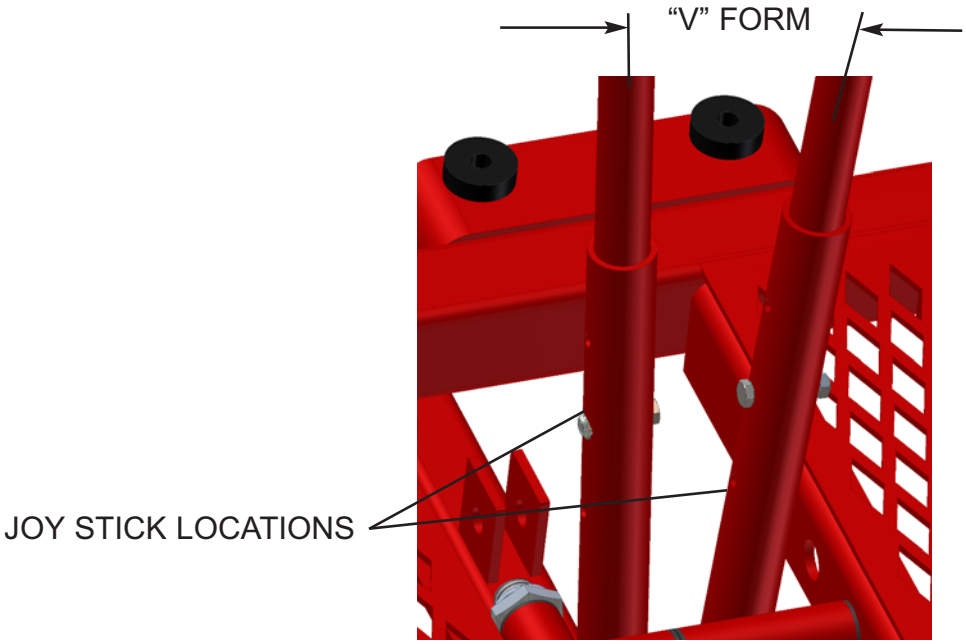


FIGURE 3.5.1
"V" FORM ORIENTATION

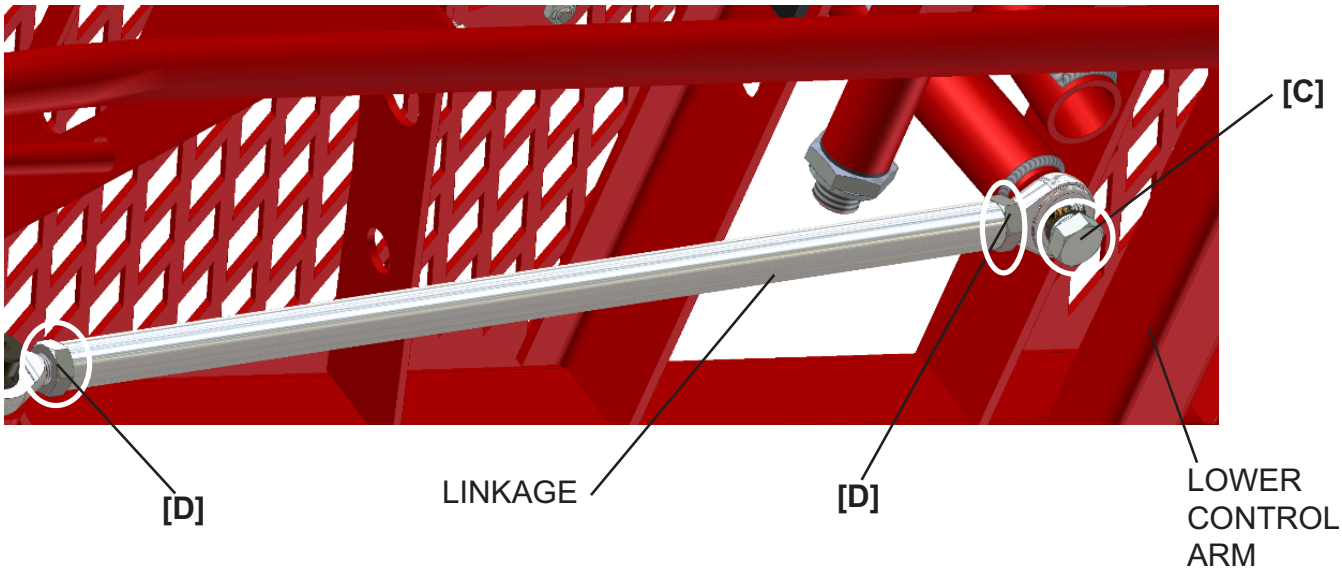


FIGURE 3.5.2
RIGHT HAND CONTROL ADJUSTMENT

3.6 Lift Lever Adjustment

3.6 Lift Lever Adjustment Procedure

Damage to and/or replacement of a trowel arm can change the adjustment of the lift lever. This can unbalance the trowel arms and cause the riding trowel to wobble during operation. To operate smoothly the lift lever on all trowel arms must be adjusted the same to ensure that the riding trowel is balanced correctly.

Adjusting the trowel arms is accomplished by using the optional trowel arm alignment jig AEC PN 016863. The service manual that is included with the alignment jig describes in detail the steps to preform this procedure and to check the flatness and straightness of the trowel arms.

The steps below describe the general procedure to remove the trowel arms to be aligned.

NOTE

Make sure that there is no pitch in the blades before attempting to remove a trowel arm.

1) Block up pressure plate **[A]** using a wooden block.

2) Remove stabilizer ring from spider assembly.

3) Remove blades from trowel arms.

4) Loosen hex head cap screw **[B]** and remove it and the external star washer from the spider boss.

5) Remove trowel arms from spider boss with lift levers in place.

6) Clean flats on trowel arm before placing it in the trowel arm jig (PN 016863).

7) Preform the alignment procedures as outlined in the alignment jig service manual (PN 047427).

8) Re-attach trowel arm to spider boss and blades to trowel arms.

9) Tighten down hex head cap screw to secure trowel arm in place.

10) Reattach stabilizer ring (only on available models).

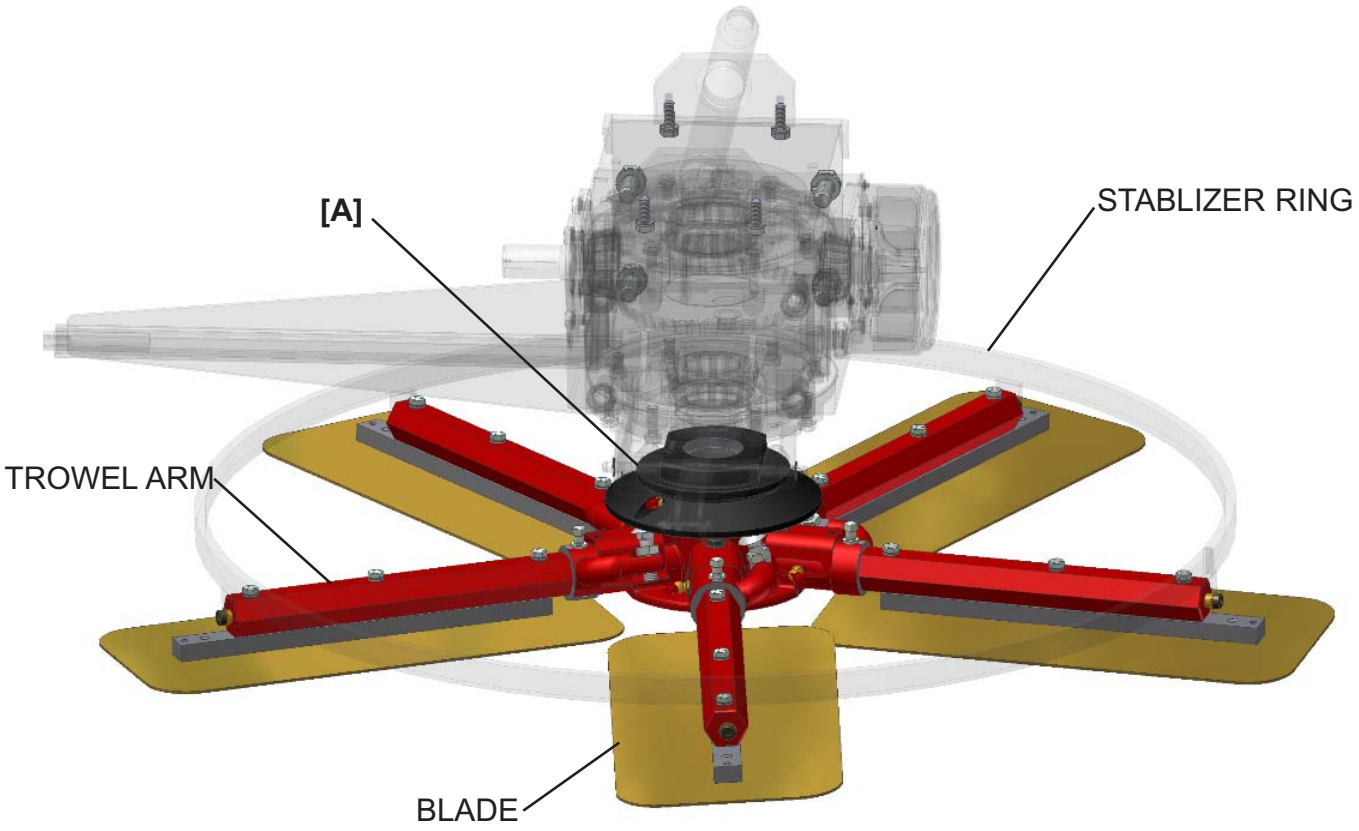


FIGURE 3.6.1
PRESSURE PLATE LOCATION

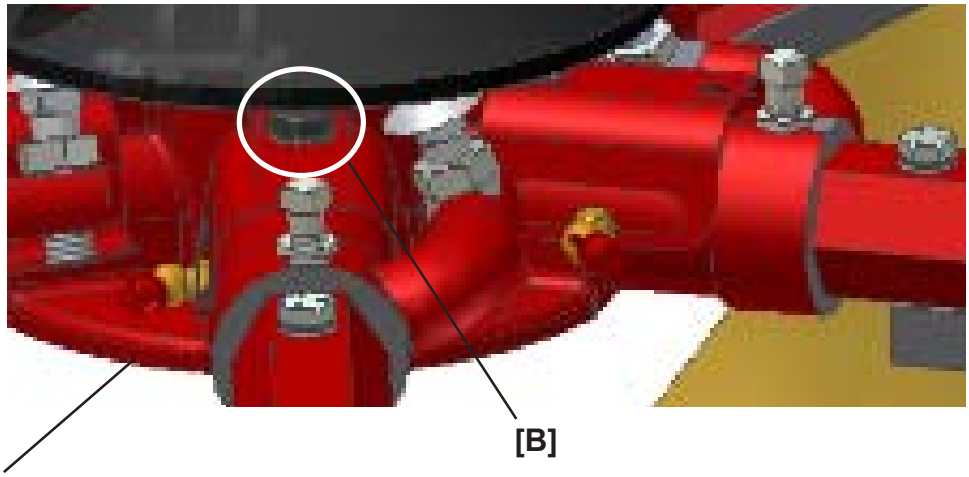


FIGURE 3.6.2
FASTENER HARDWARE REMOVAL

3.7 Transporting Trowel

3.7 Transporting Trowel Procedures

Optional dolly jacks are available for short moves or to aid in servicing the trowel. Install dolly jacks as follows:

1) Inspect dolly jack for serviceability and damage.

2) Place riding trowel on firm level ground.

3) Tie steering levers **[I]** to frame to prevent them from tipping forward when trowel is being lifted.

4) Insert the front dolly jack **[J]** fully into the holes **[K]** in the mainframe of the riding trowel. The front dolly jacks are equipped with short lifting tubes while the rear dolly jacks have long lifting tubes.

5) Insert the rear dolly jacks **[M]** with the long lifting tubes into the holes **[L]** provided in the rear of the mainframe. The holes in the mainframe are located directly opposite the front holes.

6) Turn jack handles clockwise to lift trowels and counter-clockwise to lower trowel.

FIGURE 3.7.1
STEERING LEVER LOCATION

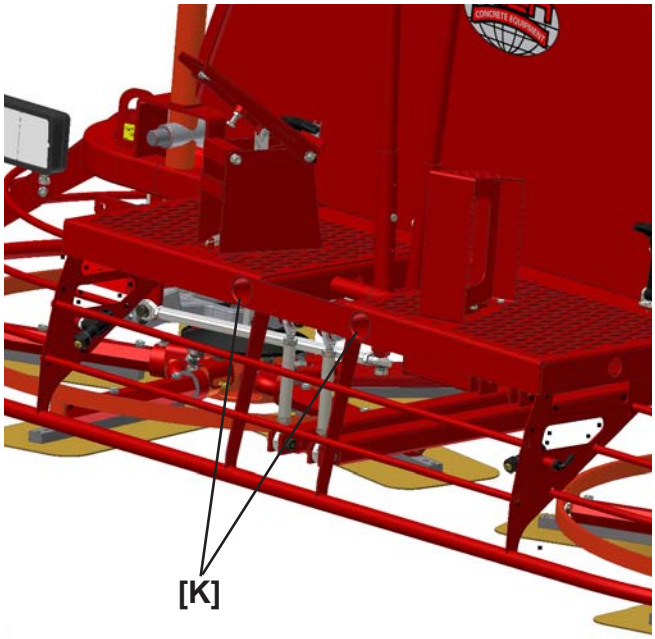


FIGURE 3.7.2
FRONT DOLLY JACK PORT LOCATION

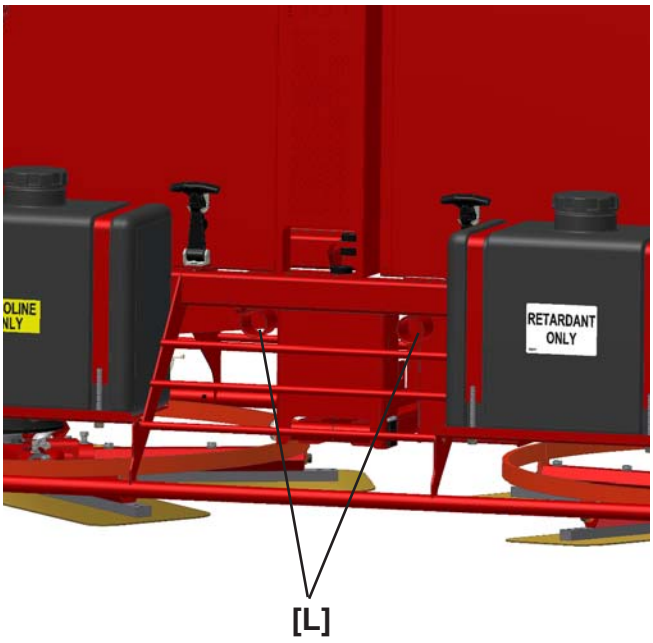


FIGURE 3.7.3
REAR DOLLY JACK LOCATION

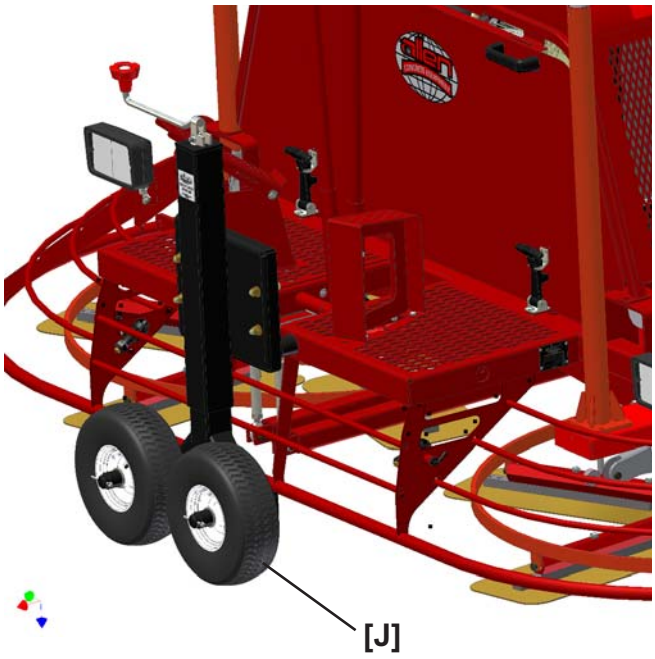


FIGURE 3.7.4
FRONT DOLLY JACK

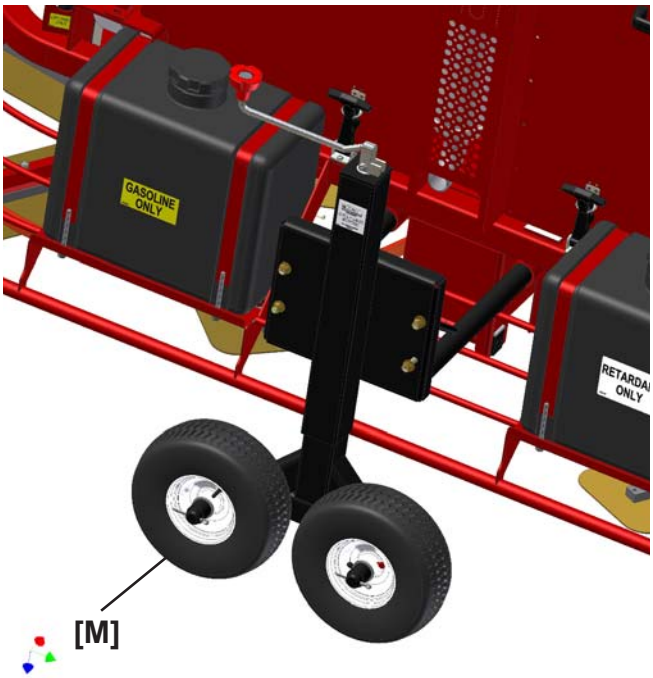


FIGURE 3.7.5
REAR DOLLY JACK

3.7, continued
Transporting Trowel

⚠ WARNING

The dolly jack lifting system is designed for short moves and to aid in servicing the trowel. It is not a substitute for a towing system or trailer. An optional lifting bridle ***[N]*** *is available and recommended for lifting the trowel. Attach the bridle to each of the four lifting eyes* ***[O]*** *on the trowel. Refer to Figure 3.7.7.*

⚠ WARNING

Secure steering levers to frame to prevent them from tipping forward when the towel is being lifted.

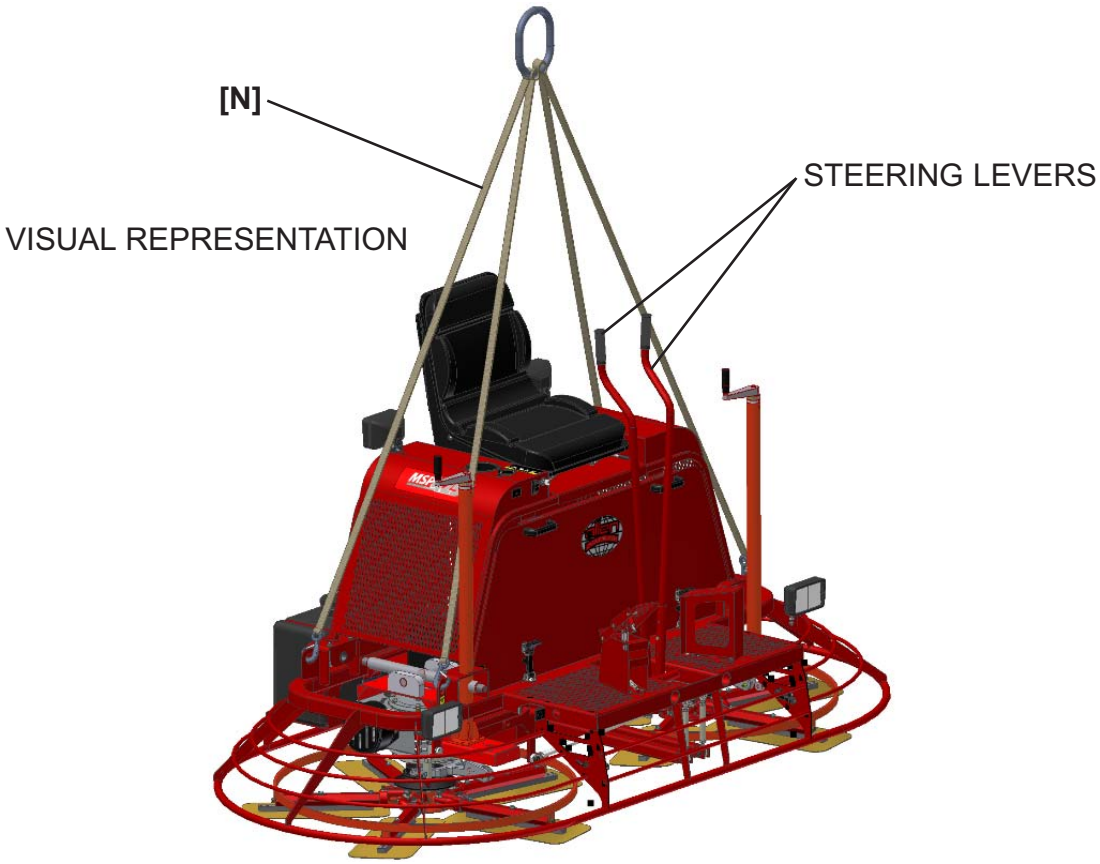


FIGURE 3.7.6
LIFTING BRIDLE

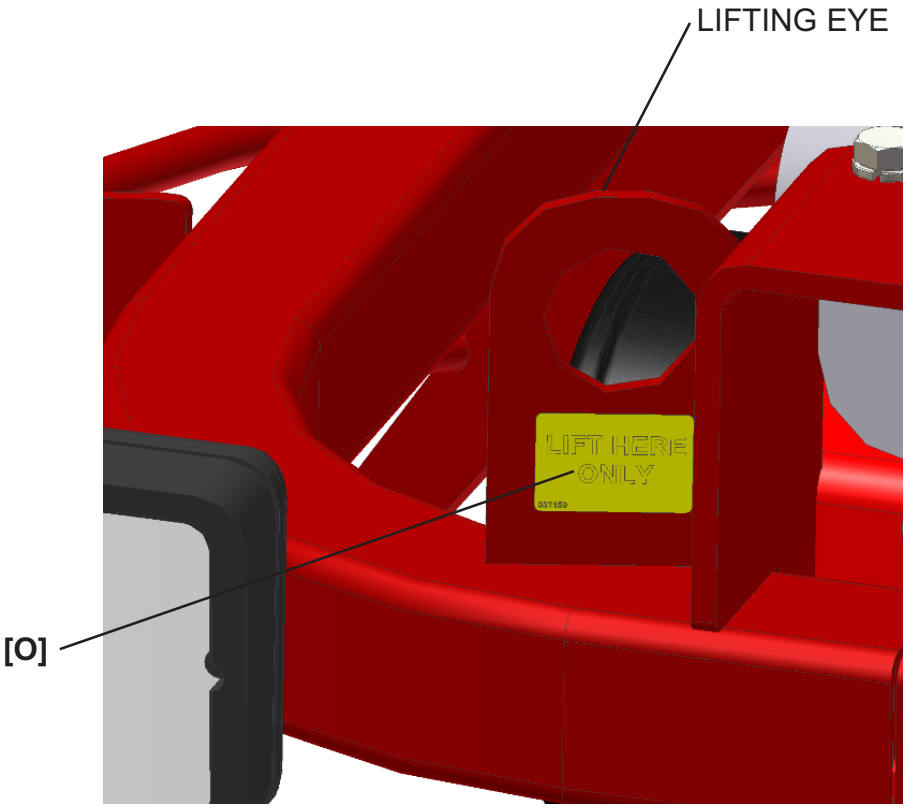


FIGURE 3.7.7
LIFTING EYE LOCATION

3.8 Battery Jump Start

3.9 Battery Jump Start Procedures

Occasionally it may be necessary to jump start a weak battery. If jump starting is necessary the following procedure is recommended to prevent starter damage, battery damage, and personal injury.

⚠ WARNING

Jump starting a battery incorrectly can cause the battery to explode resulting in severe personal injury or death. Do not smoke or allow any ignition sources near the battery and do not start a frozen battery.

⚠ WARNING

Electrical arcing can cause severe personal injury. Do not allow positive and negative cable ends to touch.

1) Use a battery of the same voltage (12V) as is used with your engine.

2) Attach one end of the positive booster cable (red) to the positive (+) terminal of the booster battery. Attach the other end to the terminal of your engine battery.

3) Attach one end of the negative booster cable (black) to the negative (-) terminal on the booster. Attach the other end of the negative cable to your engine battery.

4) Jump starting in any other manner may result in damage to the battery or the electrical system.

⚠ CAUTION

Over cranking the engine can cause starter damage. Allow 5 minutes for starter to cool if engaged for more than 15 seconds.

⚠ CAUTION

When using lights or high amperage draw accessories, idle the engine for a period of 20 minutes to bring the battery to charge state.

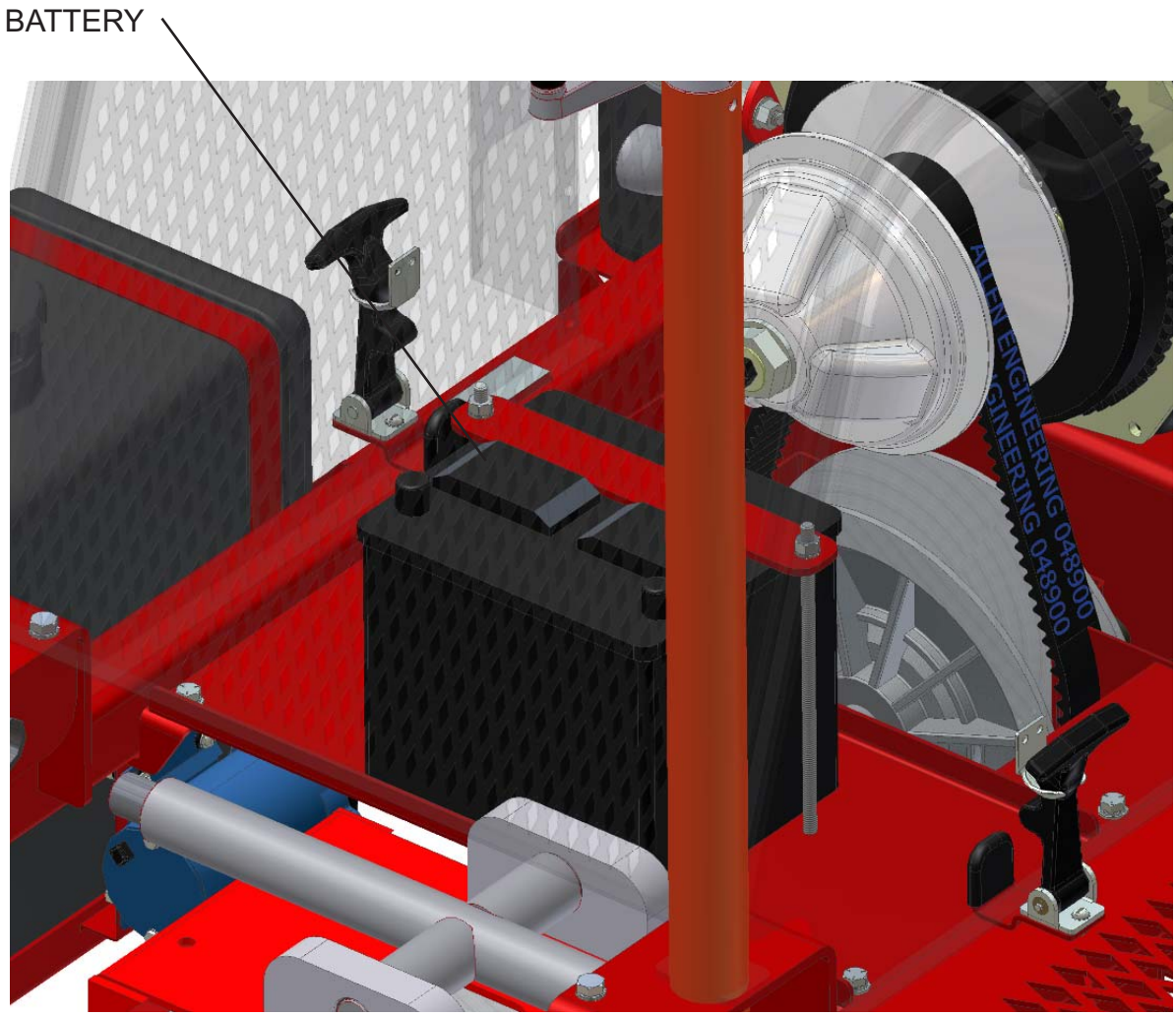


FIGURE 3.8.1
BATTERY LOCATION

3.9 Winterizing Retardant System

3.9.1 Why Winterize Retardant System

If water is allowed to freeze in the retardant system, serious damage to the hose system and the pump may occur.

NOTE

Failures of this type will void the warranty of the pump.

Pump fails to deliver water (wetting agent) to nozzles due to freezing in spray system. The best guarantee against damage is to completely drain the retardant system of all accumulation and/or use of water in system.

DANGER

DO NOT use automotive antifreeze to winterize retardant system. Such solutions are highly toxic. Ingestion may cause serious injury or death.

3.9.2 Winterizing Retardant System Procedures

To properly drain the system, perform the following steps:

1) Drain the retardant tank completely of any water. disconnect bottom hose attached to outlet on tank to allow the water to drain.

2) While bottom hose is disconnected, turn pump ON and allow the pump to purge the water from the hose system, then turn pump OFF.

3) Using an appropriate container to catch the remaining water, disconnect all hoses that are attached to the pump's inlet and outlet ports. Turn the pump ON, allowing it to operate until the water is expelled. Turn OFF power to the pump once all water has been expelled from the pump. Do not reconnect pump hoses at this time. Make a note at tank filler as a reminder: "***Hoses Are Disconnected for Winterizing Service***".

4) All pump ports and tank bottom hose must be left open to guard against any freeze damage.

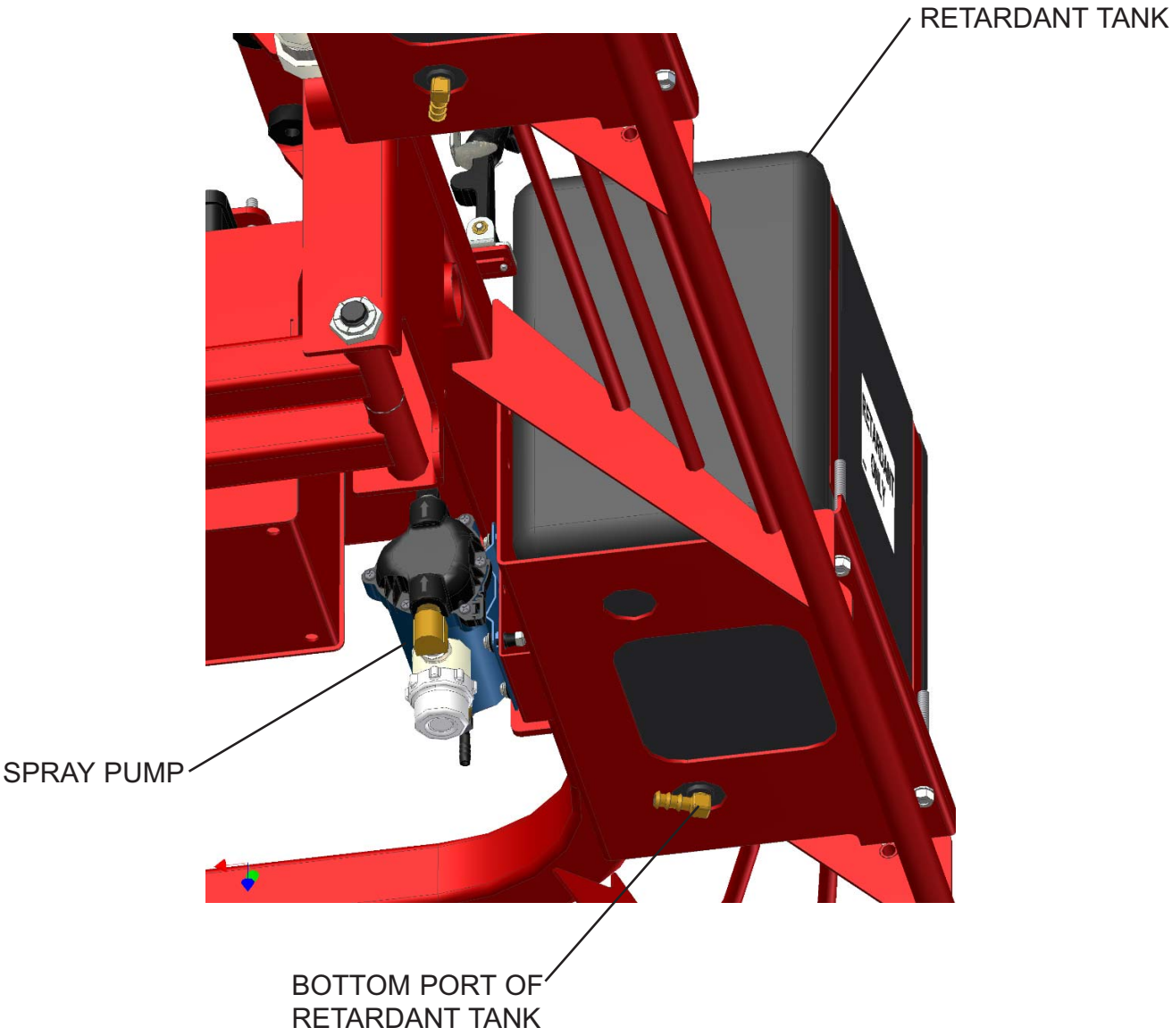


FIGURE 3.9.1
COMPONENT LOCATION

Notes

Section 4
PARTS

Section 4 PARTS

Factory Service Information

This section contains the illustrated drawings and parts list for help in identifying and/or ordering replacement parts for your machine. Follow the instructions in the front section of this manual “Ordering Parts” when ordering replacement parts to insure prompt and accurate delivery.

The Right Hand (RH) and/or Left Hand (LH) orientations are defined from the operator’s view of sitting on machine (SOM).

NOTE

All set screws have blue (LOC-TITE™) applied at the factory. If set screw is removed or loosened for any reason re-apply blue (LOC-TITE™).

NOTE

All grease fittings are capped with CAP PLUG GC-5 (AEC PN 015692) to protect the fitting. If cap becomes missing or damaged replace it as soon as possible.

NOTE

Anti-Seize is applied at the factory to all drive line coupling, gear box main and counter shafts and pitch control threaded rod assemblies. If these parts are disassembled re-apply a light coat of a graphite based anti-seize.

Replacement Parts Procedures

Section 4
PARTS

We recommend AEC quality replacement parts, available from the AEC Customer Service Department or your nearest AEC Dealer.

Part numbers are subject to change without notice. Part numbers might be different outside of the United States of America. Use part numbers listed in the applicable parts list table when you place your order. If a part number changes, the AEC Customer Service Department or your nearest AEC dealer will have the latest part number for the replacement part.

Remember when you order replacement parts, you will need your model number and serial number. These are the numbers that you have recorded in the UNIT ID section of this manual. Please order replacement parts by the appropriate part number, not the key number.

Common hardware parts may be purchased locally if they are the same type as defined in the *Description* column in the applicable parts list table.

This manual contains an illustrated parts list for help in ordering replacement parts for your machine. Follow the instructions below when ordering parts to insure prompt and accurate delivery:

1. All orders for service parts - include the serial number for the machine. Shipment will be delayed if this information is not available.

2. Include correct description and part number from the “PARTS” Section 4 of this manual.

3. Specify exact shipping instructions, including the preferred routing and complete destination address.

4. **DO NOT** return parts to AEC without receiving written authorization from AEC. All authorized returns must be shipped pre-paid.

5. When placing an order, please contact the AEC Dealer nearest you.

NOTE

All information, specifications, and illustrations in this manual are subject to change without notice and are based on the latest information at the time of publication.

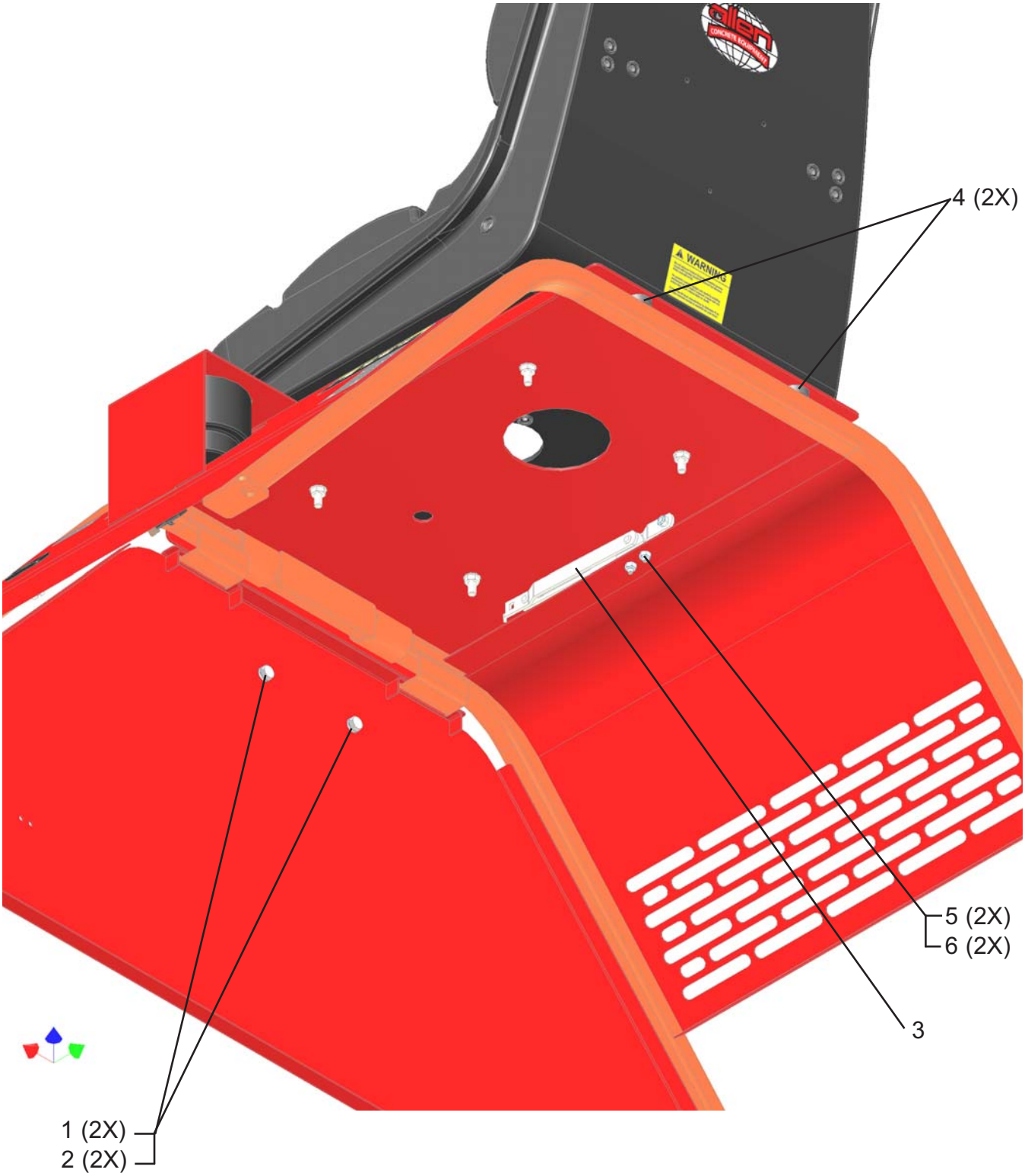
4.1 Illustration, Front View Upper Frame Unit

4.1 Parts List, Front View Upper Frame Unit

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	048988	MODULE, SEAT FRAME	(1)	REF
1	049017	FRAME, SEAT	1	
2	049060	SEAT, OPERATOR	1	
3	041537	HOLDER, CUP	1	
4	049000	SCREEN, FRONT	1	
5	048678	HANDLE, LOAD RATED NYLON	1	
6	053430	MANUAL, MSP445 MECH DRV OPER/PARTS	1	1

NOTES:
1. Not shown.

4.2 Illustration, Rear View Upper Frame Unit



4.2 Parts List, Rear View Upper Frame Unit

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	010090	WASHER, 5/16 SPLIT LOCK	2	
2	010018	BOLT, 5/16-18x1/2 HEX HEAD CAP	2	
3	048877	BRACE, 13-1/2 TABLE LEG	1	
4	047665	BUMPER, RUBBER	2	
5	010568	SCREW, 10-32x1/2 ROUND HEAD MACHINE	3	
6	029568	NUT, 10-32 NYLOCK HEX	3	
7	010036	BOLT, 3/8-16x1 HEX HEAD CAP	4	1,2
8	010464	NUT, 3/8-16 NYLOCK HEX	4	1,2

NOTES:

1. Not shown.

2. These hardware items are used to secure the seat frame assembly to the lower main frame assembly.

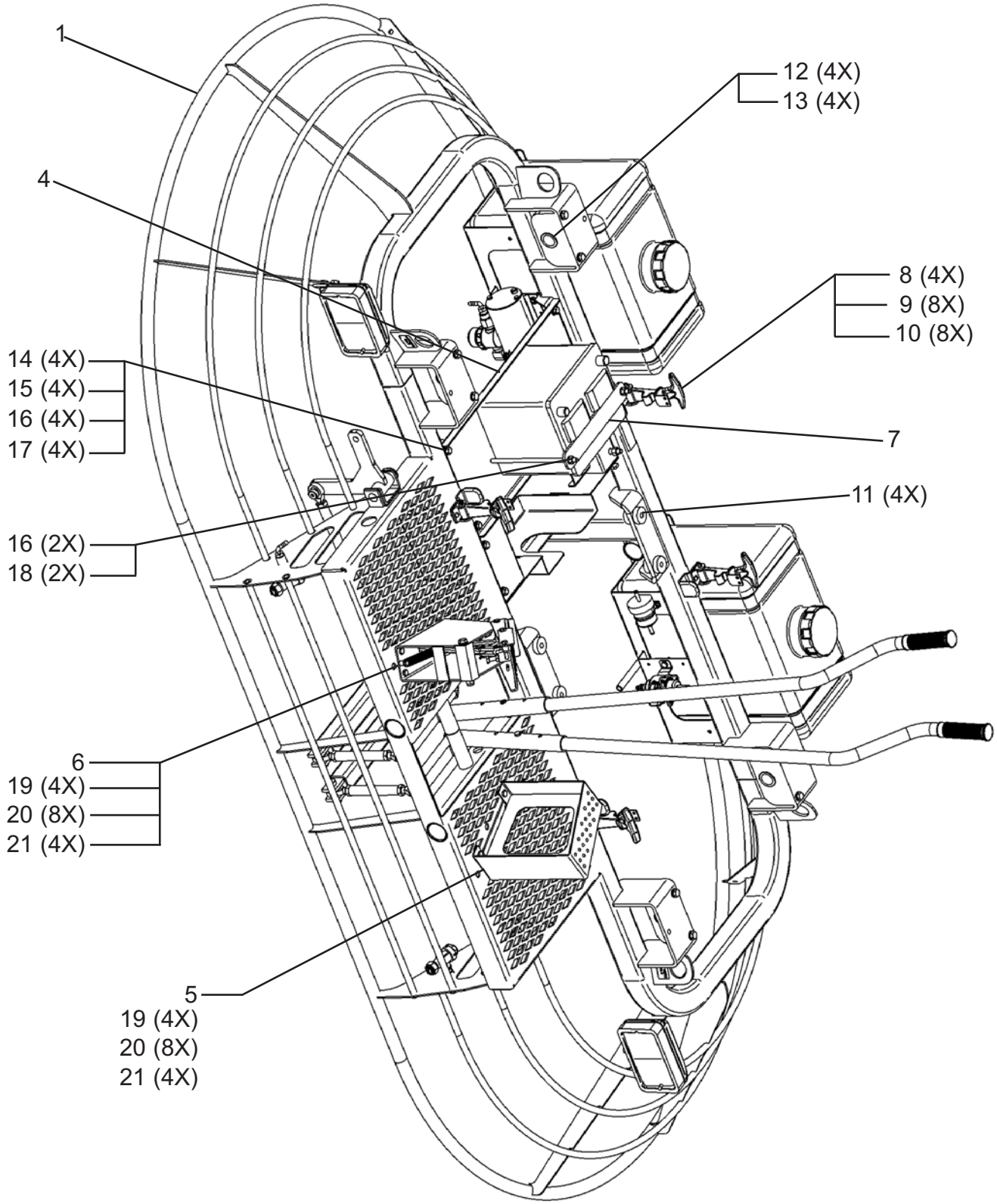
4.3 Illustration
Instrumentation-Control System

4.3 Parts List
Instrumentation-Control System

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	047685	METER, HOUR PANEL MOUNT	1	

NOTES:
1. Not shown.

4.4 Illustration, Front View Lower Frame Unit

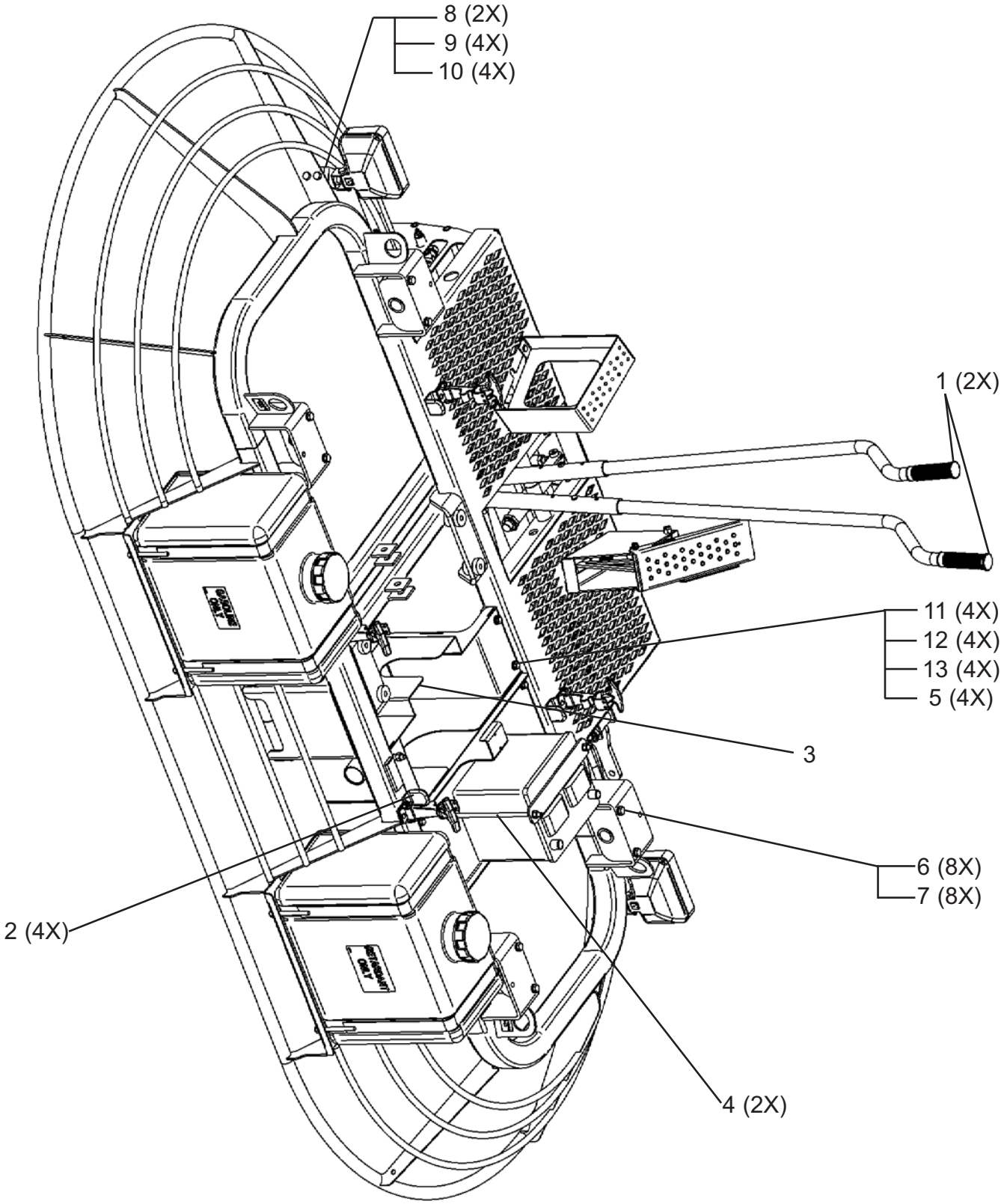


4.42 Parts List, Front View Lower Frame Unit

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	048951	MODULE, MAIN FRAME	1	
1	048838	FRAME, MSP425VG MAIN	1	
2	032097	DECAL, SERIAL NUMBER PLATE	1	1
3	012994	RIVET, 1/8x3/8 ALUM DOME	4	1
4	048917	TRAY, BATTERY MSP425	1	
5	048946	FOOTREST, MSP425	1	
6	039137	ASSY, VG/HO THROTTLE PEDAL	1	
7	048932	STRAP, BATTERY HOLD DOWN	1	
8	042260	LATCH, T-HANDLE EXLARGE DRAW	4	
9	010568	SCREW, 10-32x1/2 ROUND HEAD SLOT MACH	8	
10	032358	WASHER, NO. 10 EXTERNAL TOOTH LOCK	8	
11	048901	MOUNT, 250 LB MOTOR	4	
12	048559	BAR, BEARING HOUSING	4	
13	048560	BEARING, I-GLIDE FLANGE	4	
14	047547	NUT, 5/16-18 PAL SNAP	4	
15	010082	WASHER, 5/16 FLAT	4	
16	010090	WASHER, 5/16 SPLITLOCK	6	
17	010019	BOLT, 5/16-18x3/4 GRADE 5 HEX HEAD CAP	4	
18	010100	NUT, 5/16-18 HEX	2	
19	010002	BOLT, 1/4-20x3/4 HEX HEAD CAP	8	
20	010081	WASHER, 1/4 FLAT	16	
21	020542	NUT, 1/4-20 LOCKING HEX STOVER	8	
22	028243	CABLE, THROTTLE 52” HD	1	1
23	048977	NUT, 5/16-18 WING	2	1
24	012612	NUT, 5/16-18 NYLON HEX	4	1
25	010523	KEY, 3/16 SQ x 1-1/4 LG	1	1

NOTES:
1. Not shown.

4.5 Illustration, Rear View Lower Frame Unit

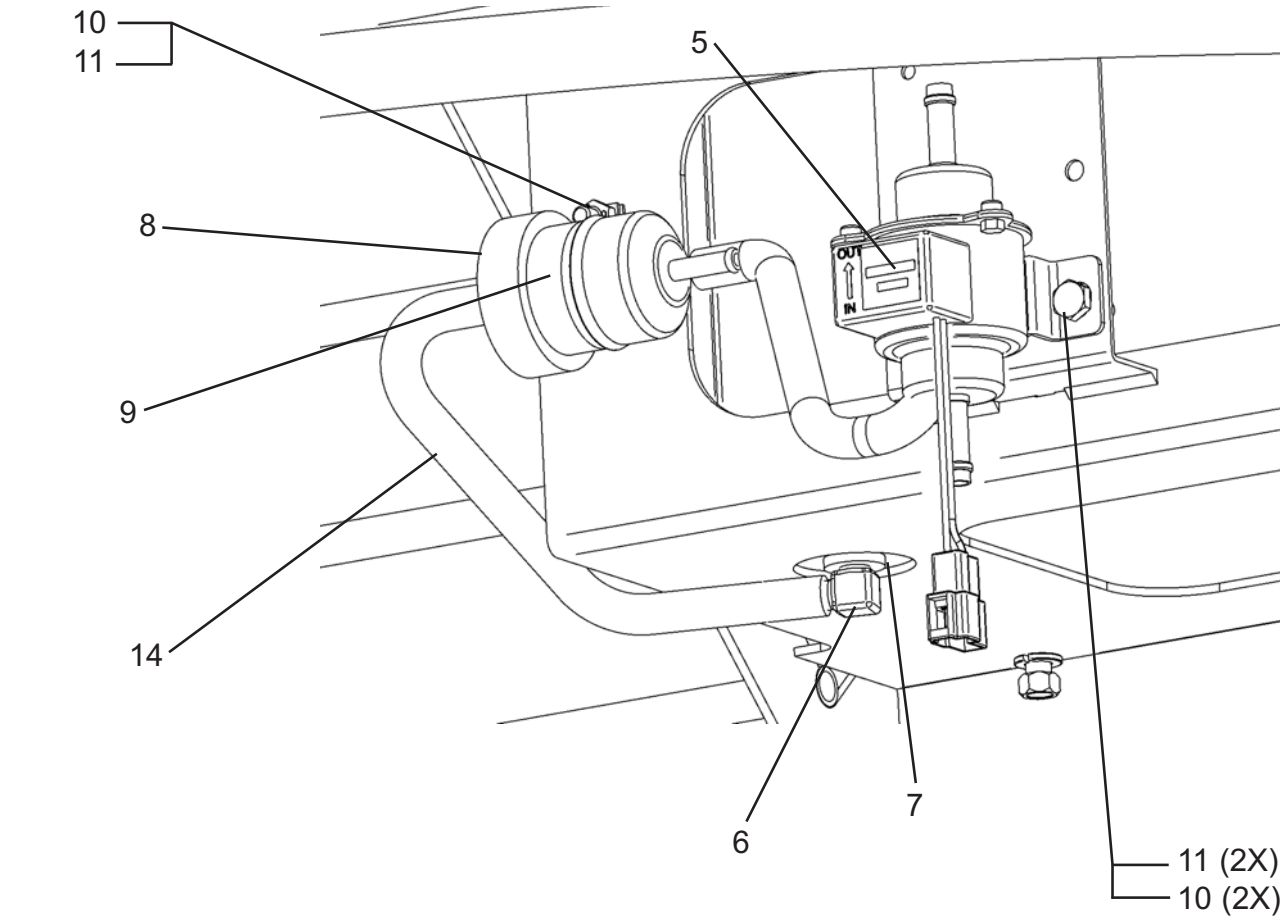


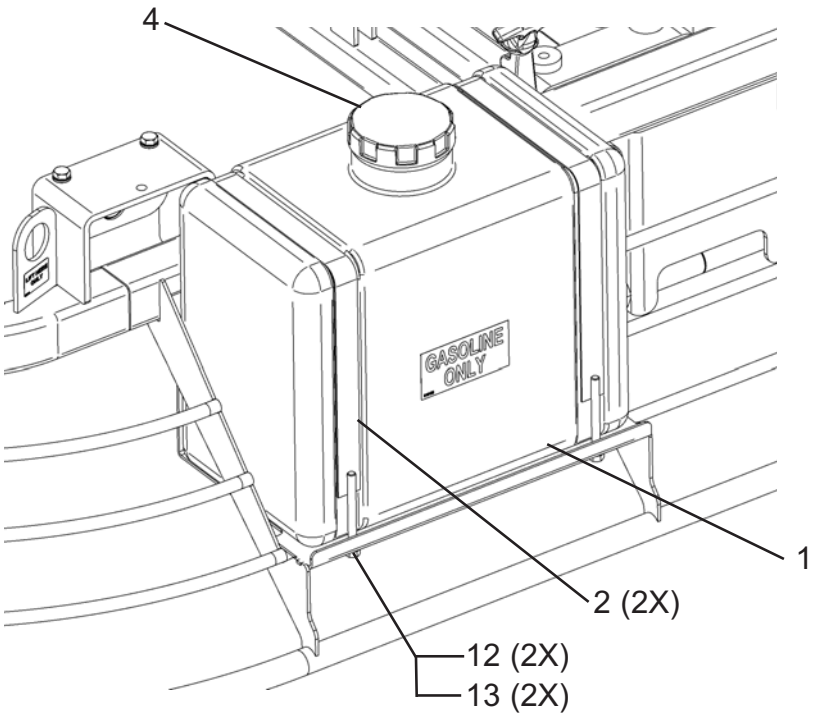
4.5 Parts List, Rear View Lower Frame Unit

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	048354	GRIP, SAT 3 Ø1 BLACK HANDLE	2	
2	047269	CAP, SCREEN STOP NOISE DAMPENER	4	
3	048913	GUARD, BELT	1	
4	047715	ROD, BATTERY RETAINER	2	
5	010090	WASHER, 5/16 SPLIT LOCK	4	
6	010091	WASHER, 3/8 SPLIT LOCK	8	
7	010036	BOLT, 3/8-16x1 HEX HEAD CAP	8	
8	042140	BRACKET, REAR LIGHT	2	
9	010035	BOLT, 3/8-16x3/4 HEX HEAD CAP	4	
10	020514	NUT, 3/8-16 LOCKING HEX STOVER	4	
11	047547	NUT, 5/16-18 PAL SNAP	4	
12	010082	WASHER, 5/16 FLAT	4	
13	010019	BOLT, 5/16-18x3/4 GRADE 5 HEX HEAD CAP	4	

NOTES:
1. Not shown.

4.6 Illustration
Fuel System





4.6 Parts List
Fuel System

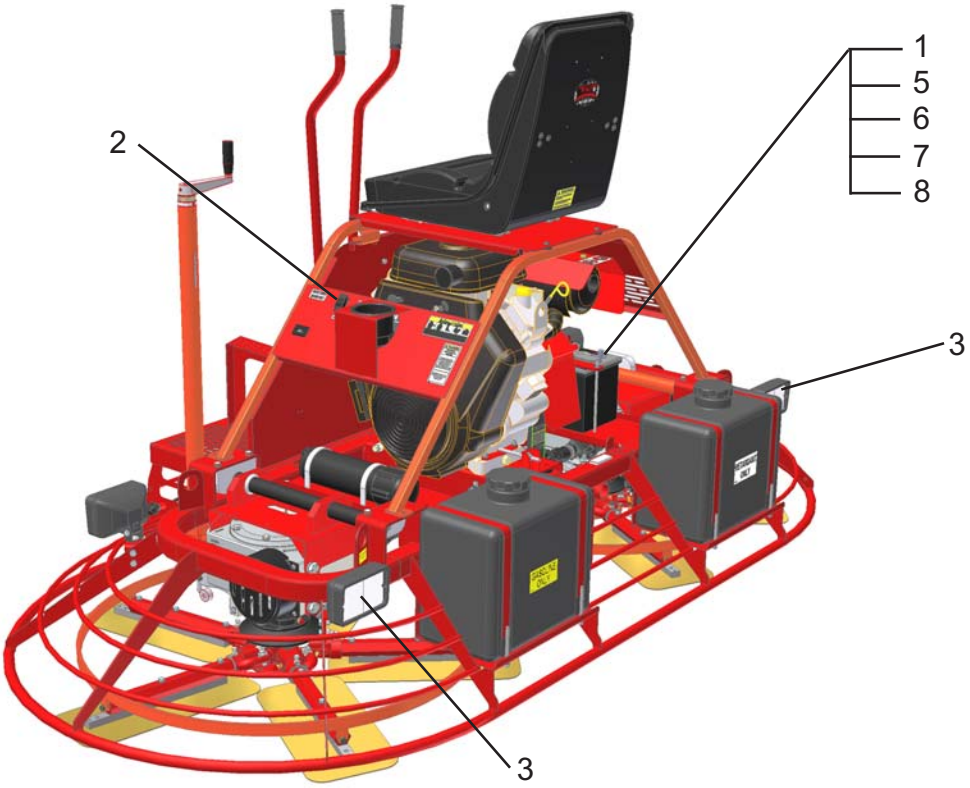
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	047700	TANK, 6 GALLON PLASTIC	1	
2	048921	STRAP, TANK	2	
3	019430	CLAMP. NO. 4 MINI HOSE	1	1
4	047701	CAP, 3-1/2 VENTED BLACK	1	
5	049227	PUMP, 12V GAS ELECTRIC FUEL	1	
6	047702	FITTING, “L” FUEL 1/4 NIPPLE 90°	1	
7	047703	BUSHING, WATER TANK	1	
8	049150	FILTER, 1/4 IN-LINE GAS FUEL	1	
9	048963	STRAP, GAS FILTER	1	
10	020542	NUT, 1/4-20 LOCK HEX STOVER	3	
11	010002	BOLT, 1/4-20x3/4 HEX HEAD CAP	3	
12	010090	WASHER, 5/16 SPLIT LOCK	2	
13	010100	NUT, 5/16-18 HEX	2	
14	039155	HOSE, 1/4 FUEL LINE	4.7	2

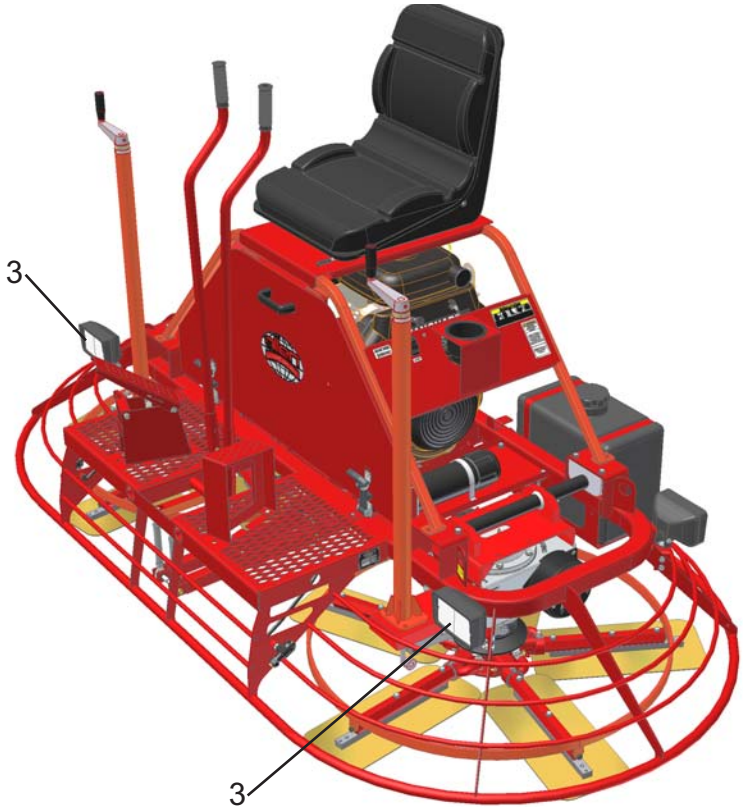
NOTES:

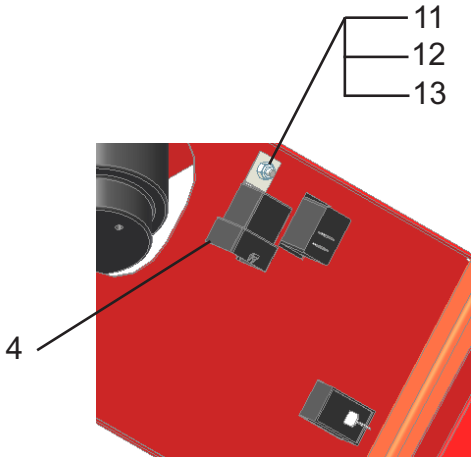
1. Not shown.

2. QTY (U/M) is indicated by feet.

4.7 Illustration
Electrical System





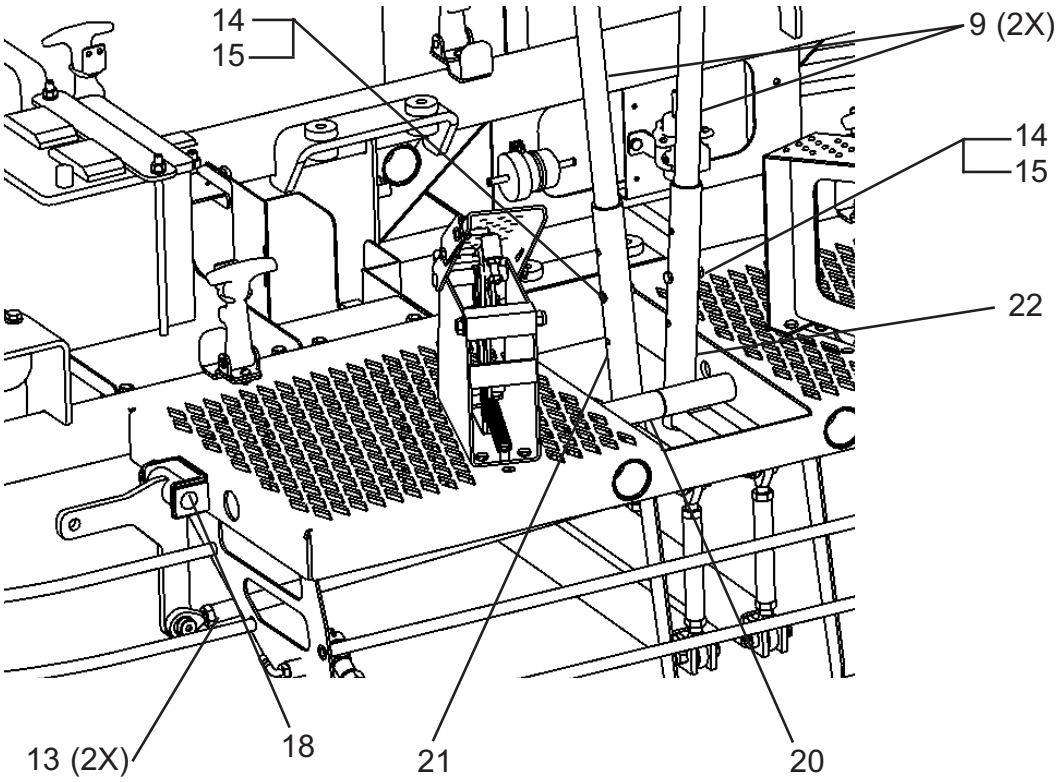


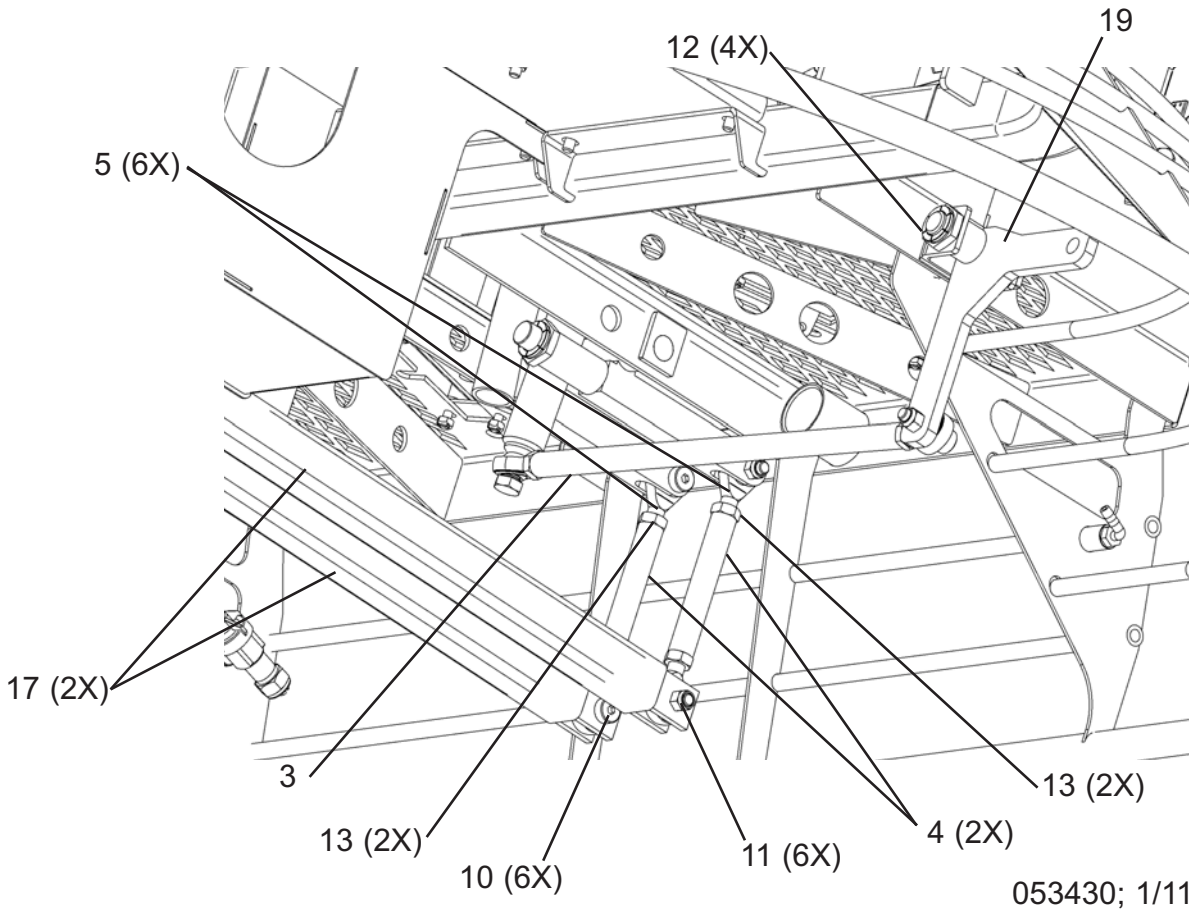
4.7 Parts List
Electrical System

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	037771	BATTERY, 12V 625CA	1	
2	032125	SWITCH, LIGHT	1	
3	036881	LAMP, 12V WORKING	4	
4	034716	RELAY, 12 V 30/50 A	1	
5	035597	INSULATOR, BATTERY TERMINAL POSITIVE	1	1
6	035598	INSULATOR, BATTERY TERMINAL NEGATIVE	1	1
7	048975	CABLE, POSITIVE BATTERY	1	1
8	048976	CABLE, NEGATIVE BATTERY	1	1
9	049064	HARNESS, MSP415 POWER/CONTROL DISTR	1	1
10	049063	HARNESS, MSP425 LIGHT	1	1
11	010568	SCREW, 10-32x1/2 ROUND HEAD SLOT MACH	1	
12	032358	WASHER, NO. 10 EXTERNAL-TOOTH LOCK	1	
13	029568	NUT, 10-32 NYLOCK HEX	1	

NOTES:
1. Not shown.

4.8 Illustration
Steering System





4.8 Parts List
Steering System

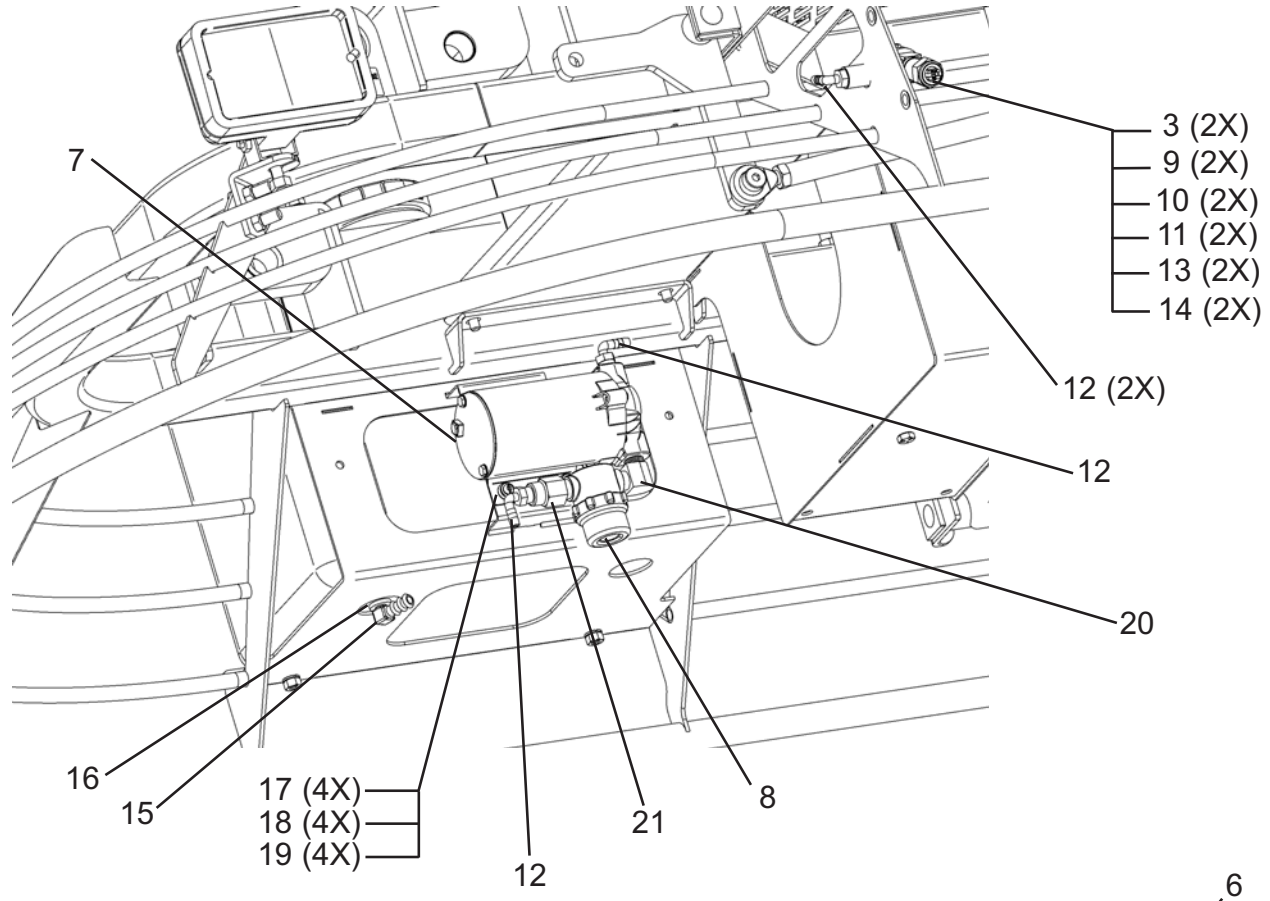
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	010083	WASHER, 3/8 LOCK	1	1
2	010102	NUT, 3/8-16 HEX	1	1
3	048898	SHAFT, LONG STEERING LINKAGE	1	
4	046701	ARM, STEERING 4-1/2	2	
5	221408	ROD, END MALE 1/2	4	
6	013740	WASHER, NO. 10 EXTERNAL TOOTH LOCK	4	
7	048958	BOLT, 1/2-20x3-1/4 GR 8 HEX HEAD CAP	1	
8				
9	048896	STICK, STEERING MSP425	2	
10	026267	BOLT, 3/8-16x1/2x1 SHOULDER	6	
11	010464	NUT, 3/8-16 NYLOCK HEX	6	
12	026447	NUT, 3/4-10 THIN SELF LOCKING HEX	4	
13	010051	NUT, 1/2-20 FINE HEX JAM	6	
14	010005	BOLT, 1/4-20x1-1/2 GRADE 8 HEX CAP	2	
15	020542	NUT, 1/4-20 LOCK HEX STOVER	2	
16				
17	048969	SHAFT, STEERING	2	1
18	048970	SHAFT, FULCRUM	1	1
19	048925	FULCRUM, L/R STEERING MS	1	
20	048894	CONTROL, RIGHT HORTIZONTAL	1	
21	048895	CONTROL, RIGHT VERTICAL	1	
22	048902	ASSY, 2-WAY STEERING	1	
23	048869	ARM, LOWER CONTROL	2	1
24	048928	SHIM, FULCRUM STEEL	2.0	1,2
25				
26	048929	BEARING, TFI-1214-16 IGL	12	1

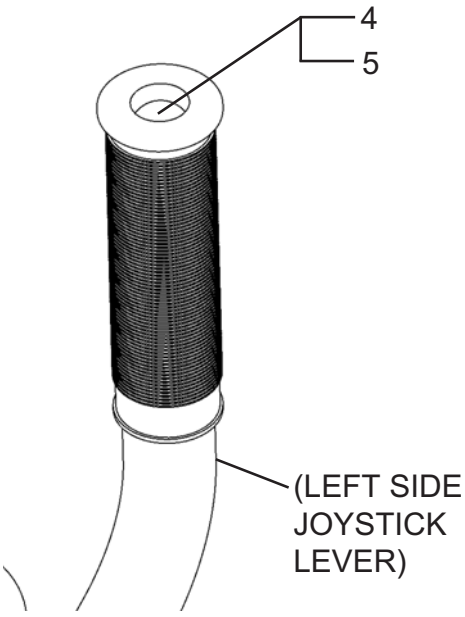
NOTES:

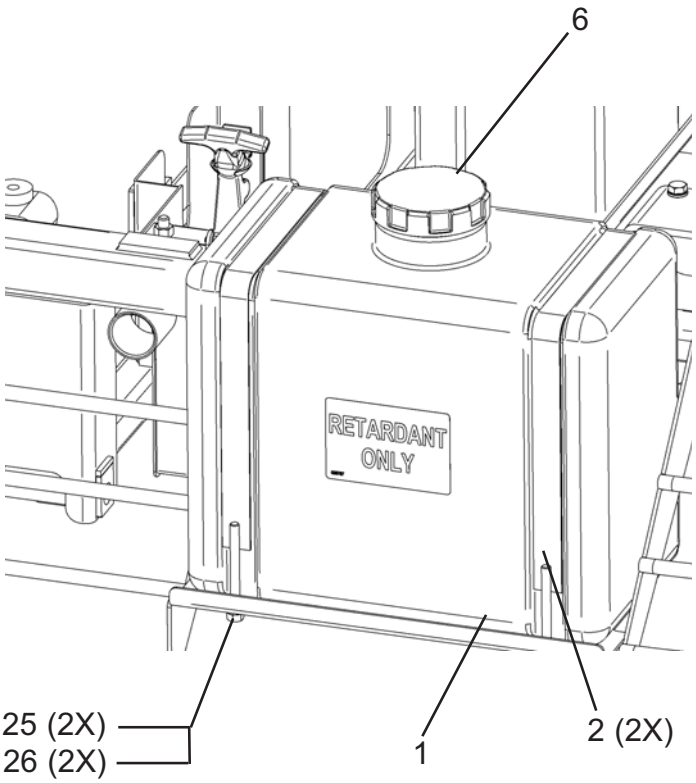
1. Not shown.

2. QTY (U/M) is indicated by package.

4.9 Illustration
Redardant Spray System







4.9 Parts List
Redardant Spray System

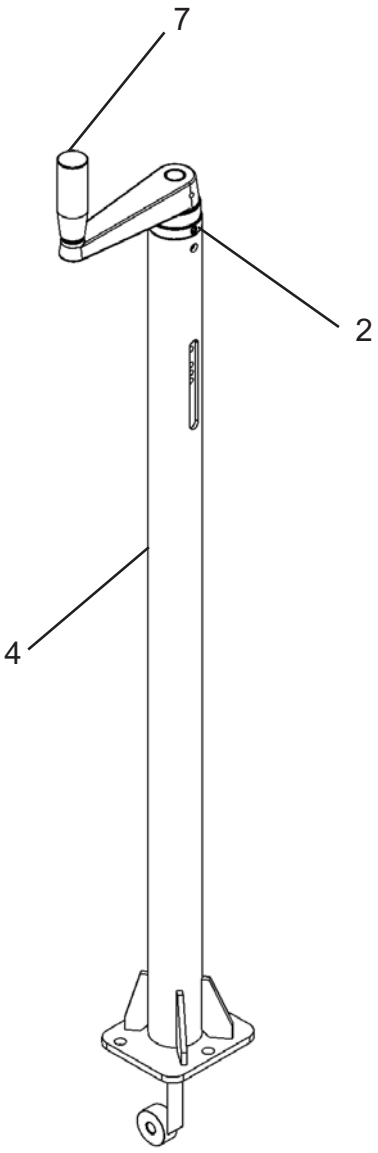
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	047700	TANK, 6 GALLON PLASTIC	1	
2	048921	STRAP, TANK	2	
3	012702	TIP, 80°x0.10 GPM BRASS SPRAY	2	
4	048909	SWITCH, PUSH BUTTON	1	1
5	048910	BEARING, Ø5/8 NYLON FLANGED SLEEVE	1	1
6	047701	CAP, 3-1/2 VENTED BLACK	1	
7	033735	PUMP, SPRAY SYSTEM	1	
8	040209	FILTER, SPRAY SYSTEM	1	
9	041604	BODY, NYLON CHECK VALVE NOZZLE	2	
10	041606	NIPPLE, 1/4 NPT CLOSE PLASTIC	2	
11	041624	RETAINER, NYLON SPARY TIP	2	
12	047933	ELBOW, 1/4 PUSHLOK X 1/4 NPT PLASTIC	4	
13	047578	STRAINER, POLY 50 MESH	2	
14	012702	TIP, 80°x0.10 GPM BRASS SPRAY	2	
15	047702	FITTING, “L” FUEL 1/4 NIPPLE 90°	1	
16	047703	BUSHING, WATER TANK	1	
17	016382	SCREW, 10-32x1 ROUND HEAD SLOT MACH	4	
18	018072	WASHER, NO. 10 SAE FLAT	4	
19	029568	NUT, 10-32 NYLOCK HEX	4	
20	040387	ELBOW, 3/8x1/4 90° STREET BRASS	1	
21	040388	FITTING, 3/8x1/4 BRASS FM-TO-FM REDUCER	1	
22	048652	TEE, PLASTIC 1/4x1/4	1	1
23	010090	WASHER, 5/16 SPLIT LOCK	2	
24	010100	NUT, 5/16-18 HEX	2	
25	0482416	HOSE, 3/8 WATER LINE	7.75	1,2
26	048959	GROMMET, 1/2 RUBBER HOSE	3	1

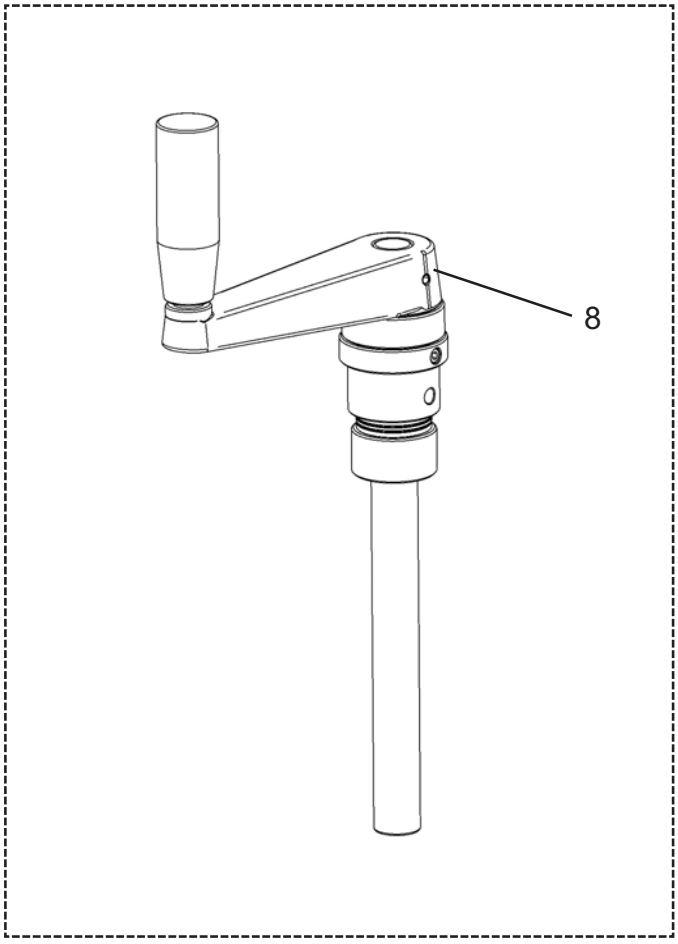
NOTES:

1. Not shown.

2. QTY (U/M) shown in feet.

4.10 Illustration
Pitch Control Assembly





4.10 Parts List
Pitch Control Assembly

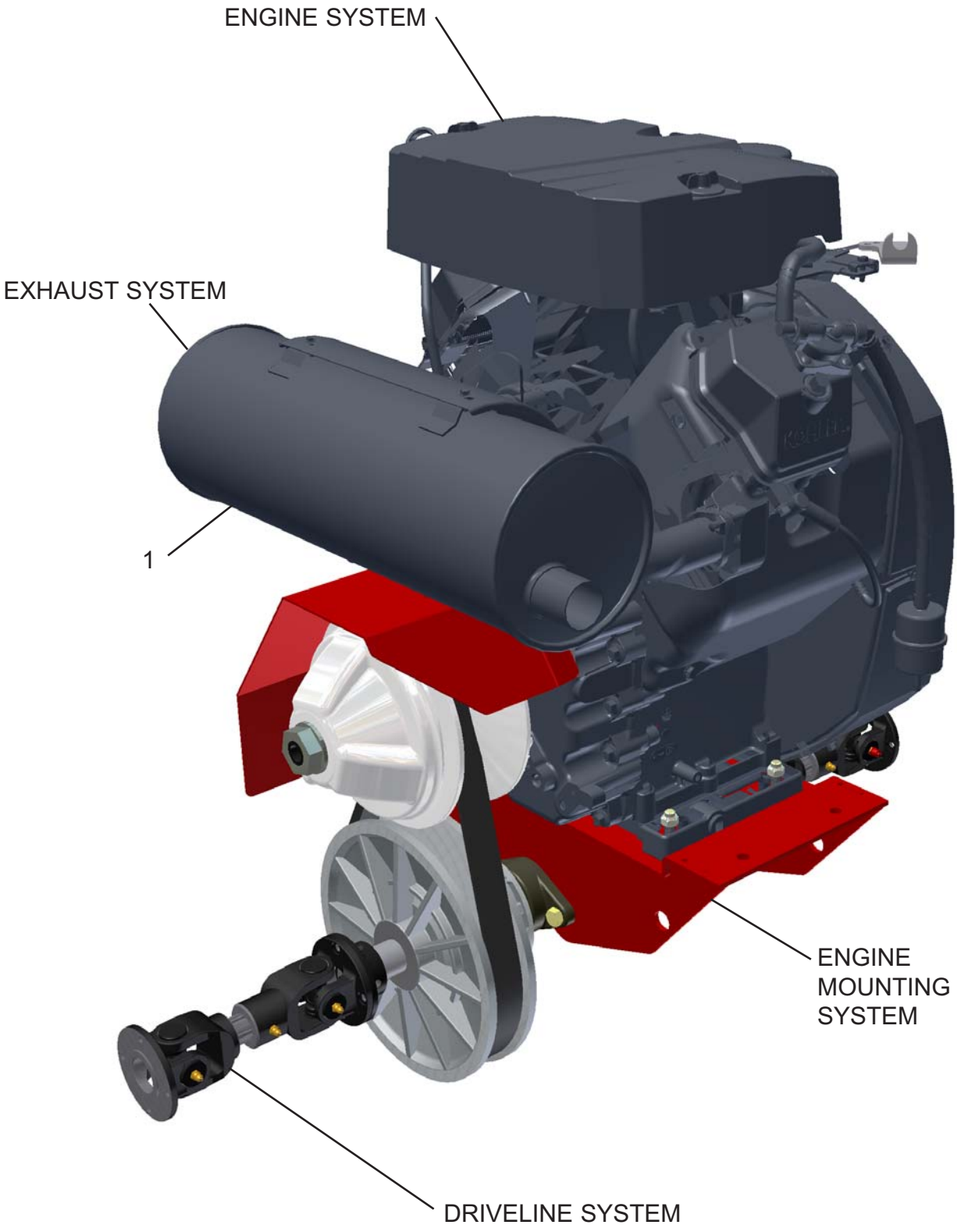
REF	PART NO.	DESCRIPTION	QTY	NOTES
-	032370	ASSY, PITCH CONTROL	2	
1	015410	SCREW, 1/4-20x3/8 RND HD MACH	2	1
2	015747	PIN, 3/16x1-3/8 ROLL	1	
3	015768	SCREW, 1/4-20x1/4 SCKT HD CAP	2	1
4	026240	TUBE, PRO PITCH CONTROL	1	
5	029812	BUSHING, SLIDE PITCH CONTROL	1	1
6	029822	SHAFT, PITCH CONTROL	1	1
7	032115	KNOB, PITCH CONTROL HANDLE	1	
8	032157	ASSY, CRANK HANDLE AND BEARING	1	2

NOTES:

1. Not shown.

2. QTY values shown are for one (1) comlete pitch control assembly. The rider uses two (2) of these pitch control assembly.

4.11 Illustration
Gas Power Unit

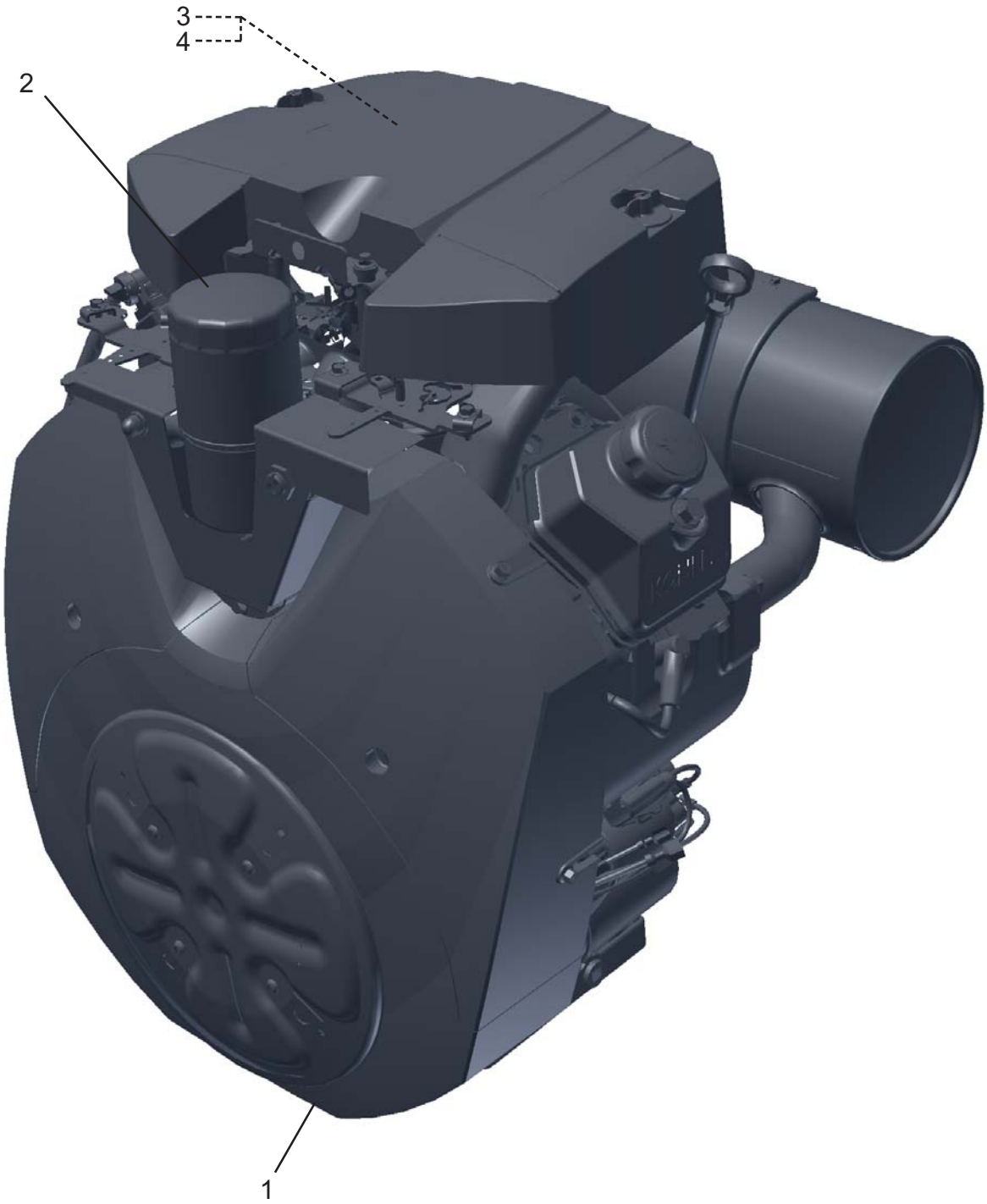


4.11 Parts List
Gas Power Unit

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	053304	ASSY, MSP445 POWER UNIT	(1)	REF

NOTES:
1. Not shown.

4.12 Illustration
Engine System



4.12 Parts List
Engine System

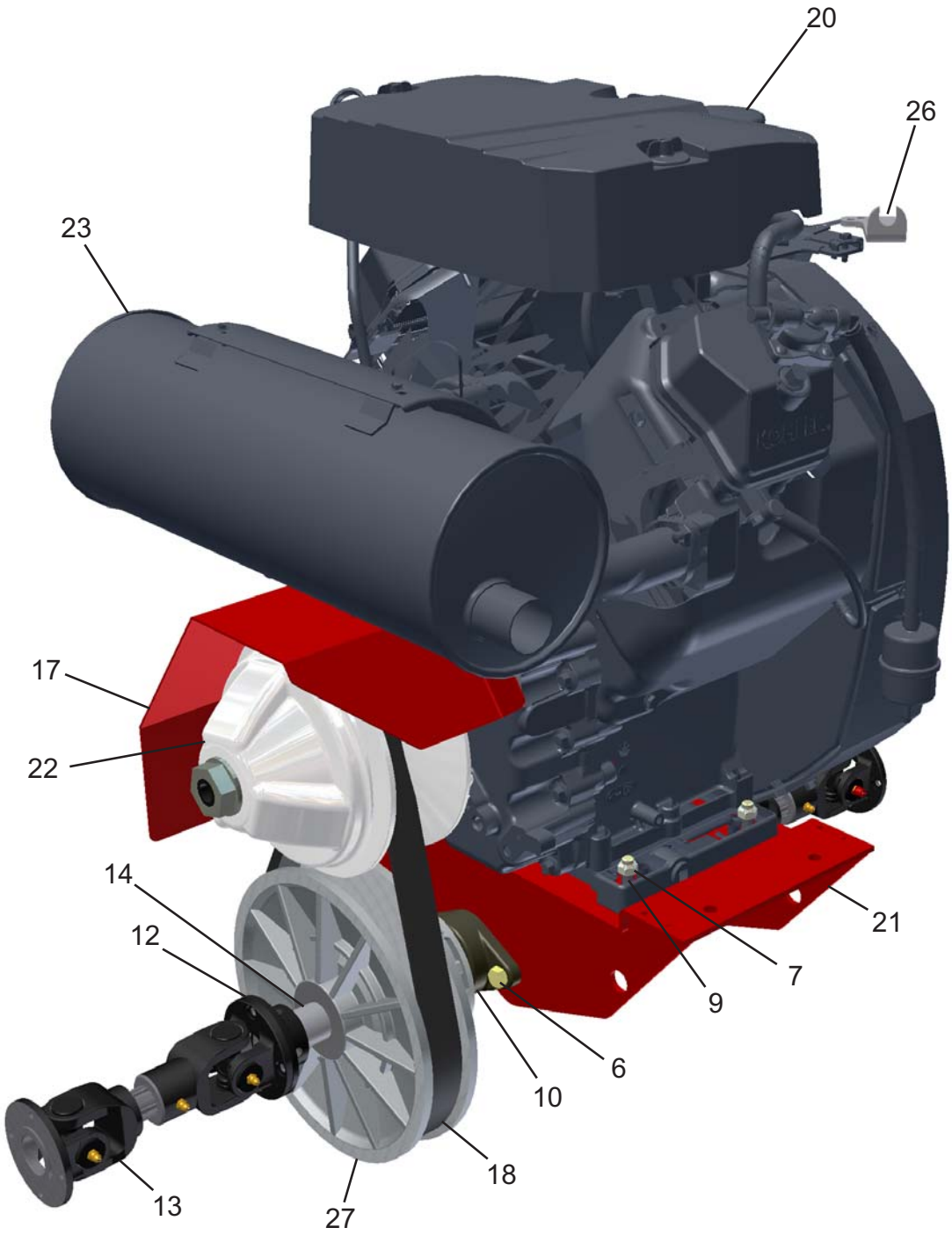
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	053306	ENGINE, KOHLER CH-1000	1	
2	52 050 02-S	FILTER, ENGINE OIL	1	2
3	62 083 03-S	FILTER, PRE-CLEANER FOAM AIR CLEANER	1	1, 2
4	62 083 04-S	FILTER, PRIMARY CARTRIDGE AIRE CLEANER	1	1, 2
5	24 050 13-S	FILTER, FUEL	1	1, 2

NOTES:

1. Not shown.

2. Service Part Item.

4.13 Illustration
Engine Mounting System

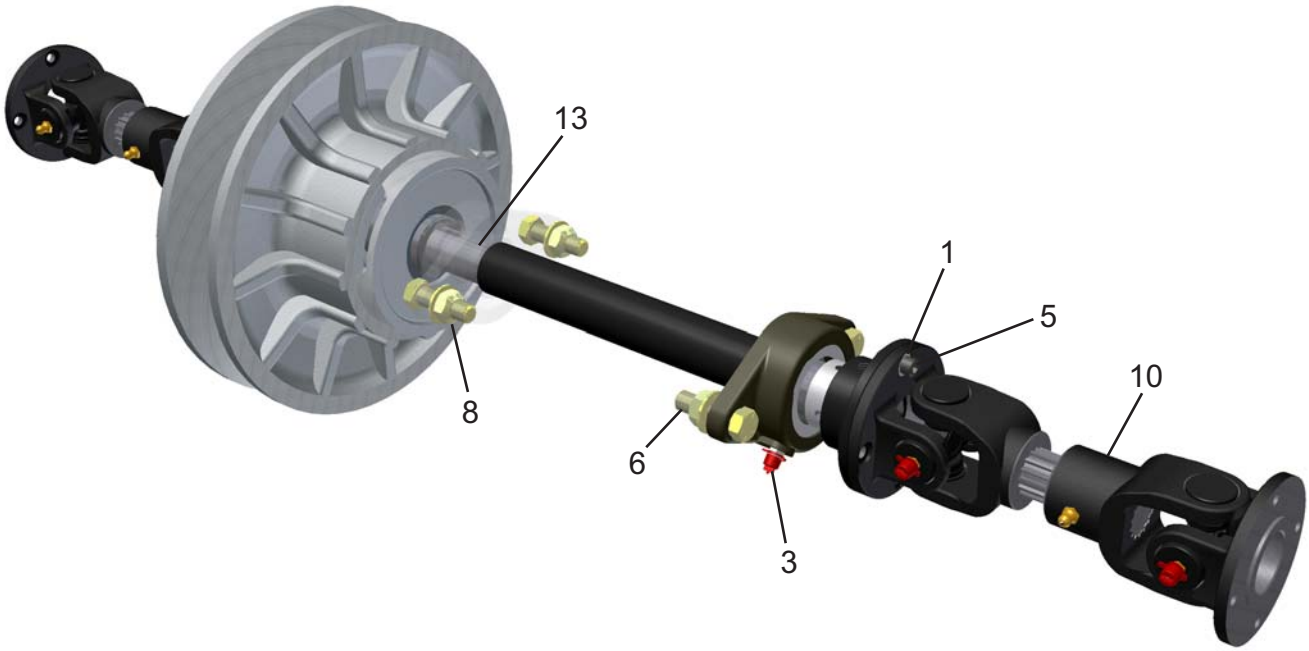


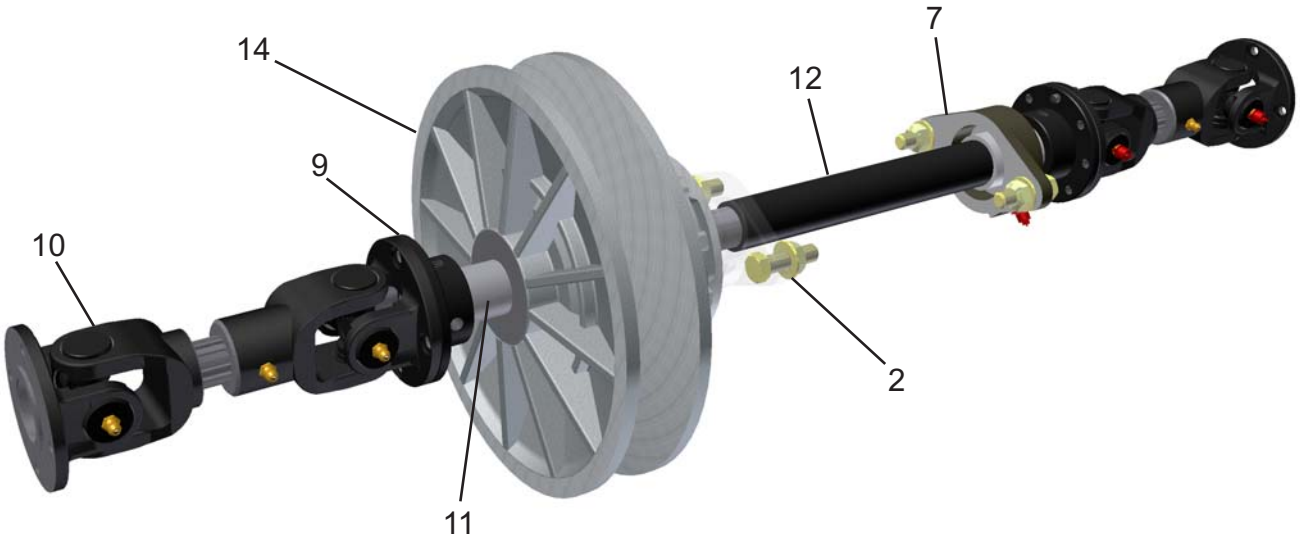
4.13 Parts List
Engine Mounting System

ITEM	PART #	DESCRIPTION	QTY
1	010089	WSHR, Ø1/4 ID Z-STL SPLIT LOCK	1
2	010096	FSTN, Ø7/16 ID Y-ZINC HRDND FLAT	4
3	015692	CAP, Ø1/4 RED GREASE	4
4	015696	KEY, .25x1.25 LG HARD RAD	3
5	017314	SHCS, 1/4-20 X 5/8	1
6	017898	FSTN, HHCS 7/16-20 X 1-1/2 GR8	4
7	020514	FSTN, NUT STOVER LOCK 3/8-16	4
8	033661	PLATE, BELT GURD BKT. F/ BLM	1
9	039740	BOLT, 3/8-16 X 2-1/4 GR 8 HHC	4
10	046904	BRG, Ø1 BORE 2-HOLE FLNG	2
11	047477	NUT, 7/16-20 YZ GR 8 STOVER	4
12	047635	HUB, Ø1 BORE U-JOINT CENTER SHAFT	2
13	047637	ASSY, U-JOINT TELESCOPING	2
14	047845	SPCR, 1.125 LG DRVN PUL POSN	1
15	048810	SPACER, BEARING MSP425	1
16	048845	SHAFT, DRIVE MSP425	1
17	053136	CLUTCH COVER, MSP445	1
18	053204	Belt, CVTech	2
19	053223	KEY, 3/16 X 1/4 X 2	1
20	053306	ENGINE, KOHLER CH-1000	1
21	053308	PLATE, ENGINE MSP445 WELDED	1
22	053327	PULLEY, MP205 20:1 DRIVER	1
23	053328	MUFFLER F/ KOHLER, SIDE DISCHARGE	1
24	053334	OIL DRAIN HOSE	1
25	053384	SPACER F/ CLUTCH	1
26	053385	THROTTLE BRKT	1
27	053389	PULLEY, MSP445	1

NOTES:
1. Not shown.

4.14 Illustration
Driveline System



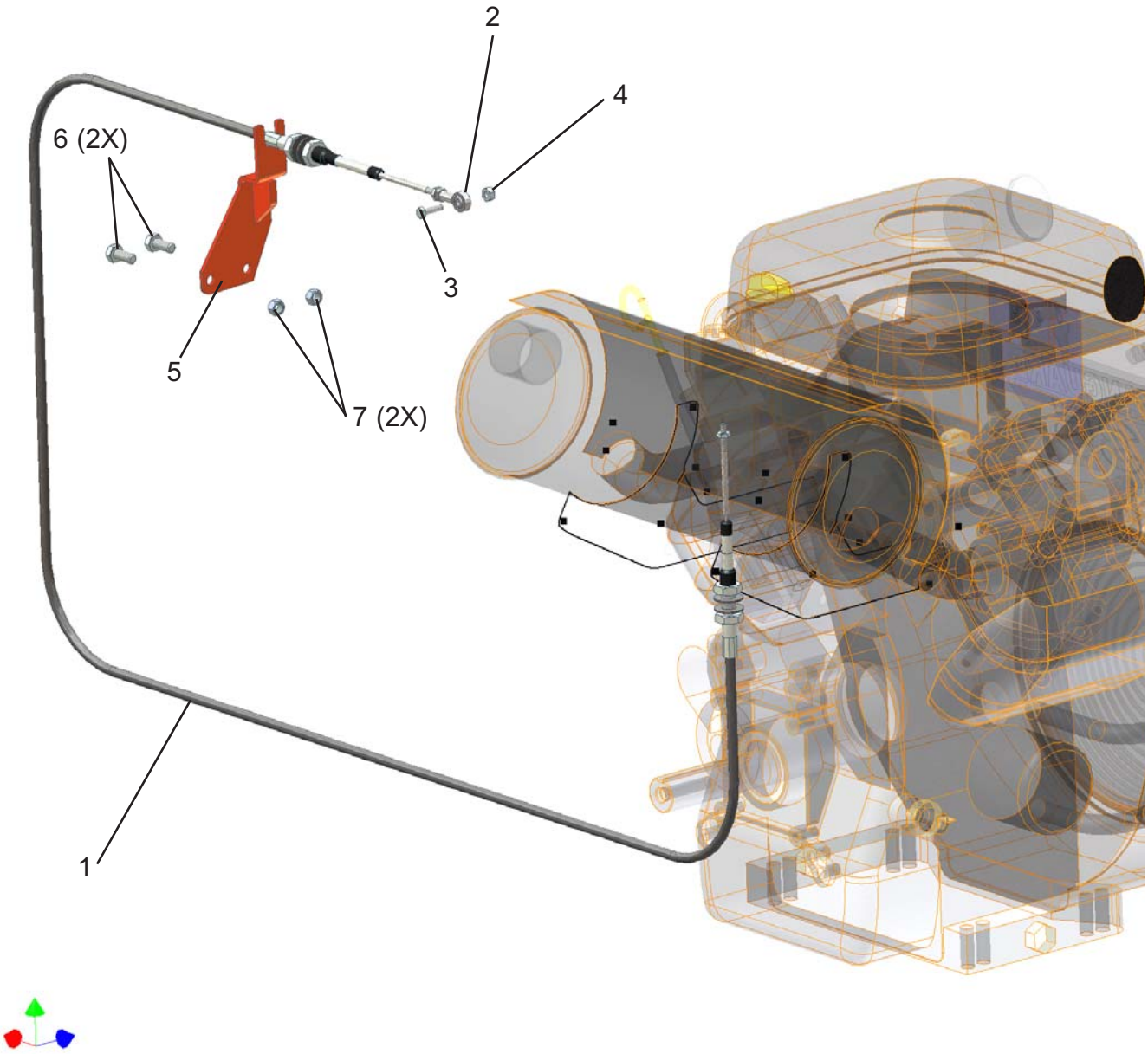


4.14 Parts List
Driveline System

ITEM	PART #	DESCRIPTION	QTY
1	010089	WSHR, Ø1/4 ID Z-STL SPLIT LOCK	16
2	010096	FSTN, Ø7/16 ID Y-ZINC HRDND FLAT	4
3	015692	CAP, Ø1/4 RED GREASE	4
4	015696	KEY, .25x1.25 LG HARD RAD	3
5	017314	SHCS, 1/4-20 X 5/8	16
6	017898	FSTN, HHCS 7/16-20 X 1-1/2 GR8	4
7	046904	BRG, Ø1 BORE 2-HOLE FLNG	2
8	047477	NUT, 7/16-20 YZ GR 8 STOVER	4
9	047635	HUB, Ø1 BORE U-JOINT CENTER SHAFT	2
10	047637	ASSY, U-JOINT TELESCOPING	2
11	047845	SPCR, 1.125 LG DRVN PUL POSN	1
12	048810	SPACER, BEARING MSP425	1
13	048845	SHAFT, DRIVE MSP425	1
14	053389	PULLEY, MSP445	1

NOTES:
1. Not shown.

4.15 Illustration
Throttle Control System

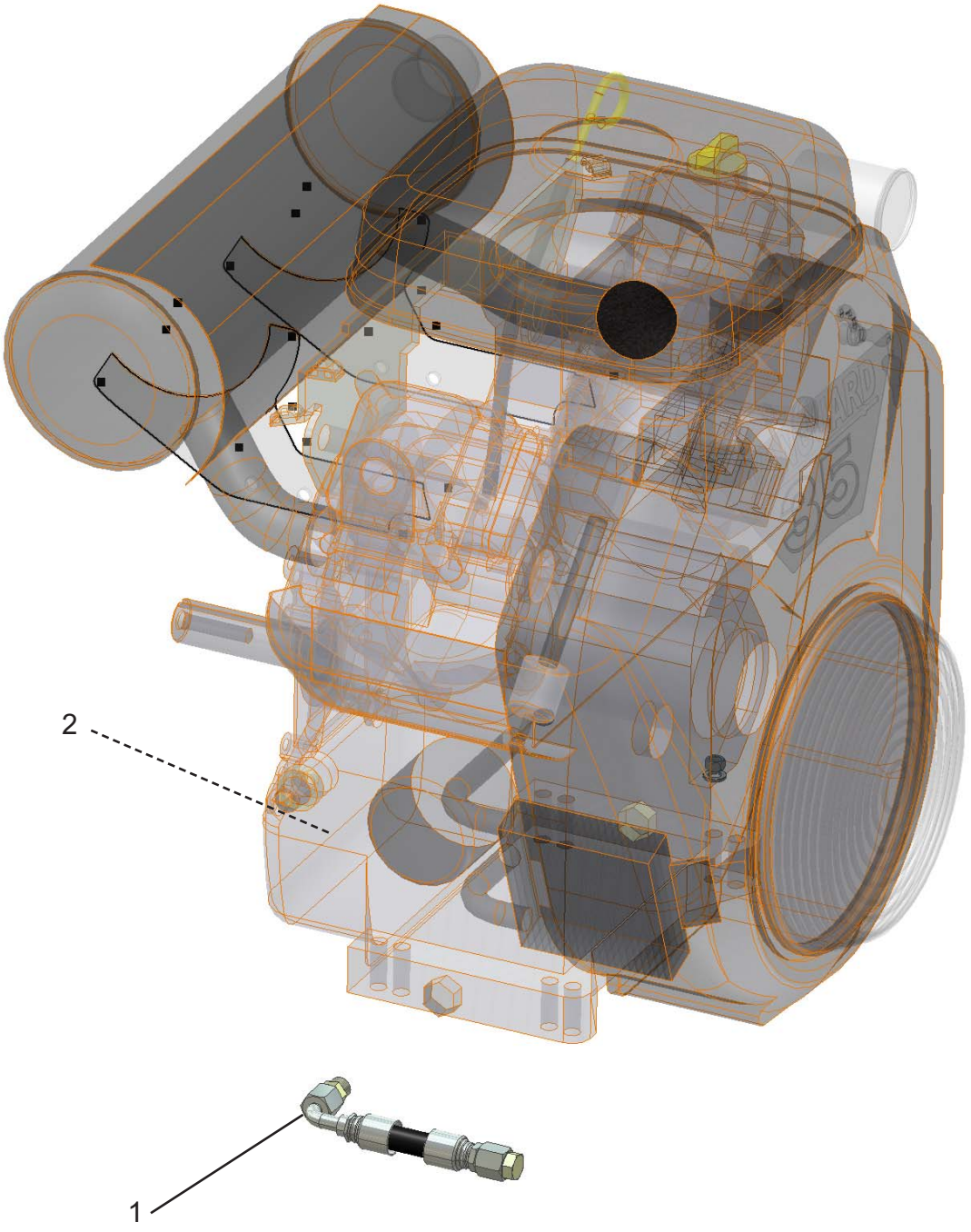


4.15 Parts List
Throttle Control System

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	032300	ASSY, 60 LG THROTTLE CABLE	1	
2	049037	ROD, 10-32 FEMALE END	1	
3	013728	SCR, 10-32x3/4 HEX HEAD MACHINE	1	
4	029568	NUT, 10-32 NYLOCK HEX	1	
5	053385	THROTTLE BRKT	1	
6	010019	BOLT, 5/16-18x3/4 GR 5 HHC	2	
7	010100	NUT, 5/16-18 HEX	2	

NOTES:
1. Not shown.

4.16 Illustration
Oil Drain System



4.16 Parts List
Oil Drain System

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	053334	ASSY, MSP445 OIL DRAIN	1	
2	001005	OIL, CONOCO M.O. 10W30W	0.8	1,2

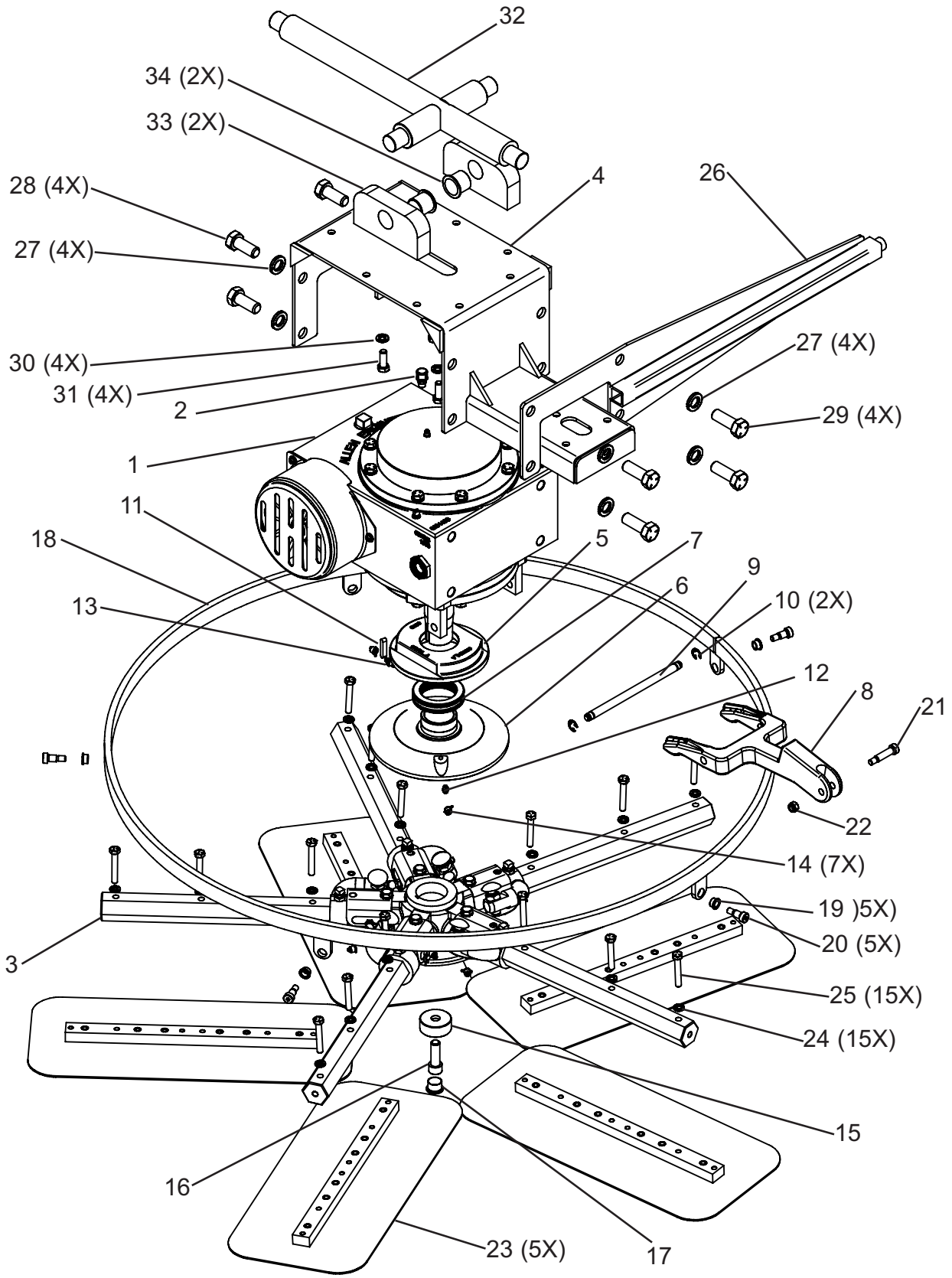
NOTES:

1. Not shown.

2. QTY (U/M) is indicated by gallons.

4.17 Illustration
Exhaust System

4.18 Illustration
Right Hand 20:1 Rotor Assembly



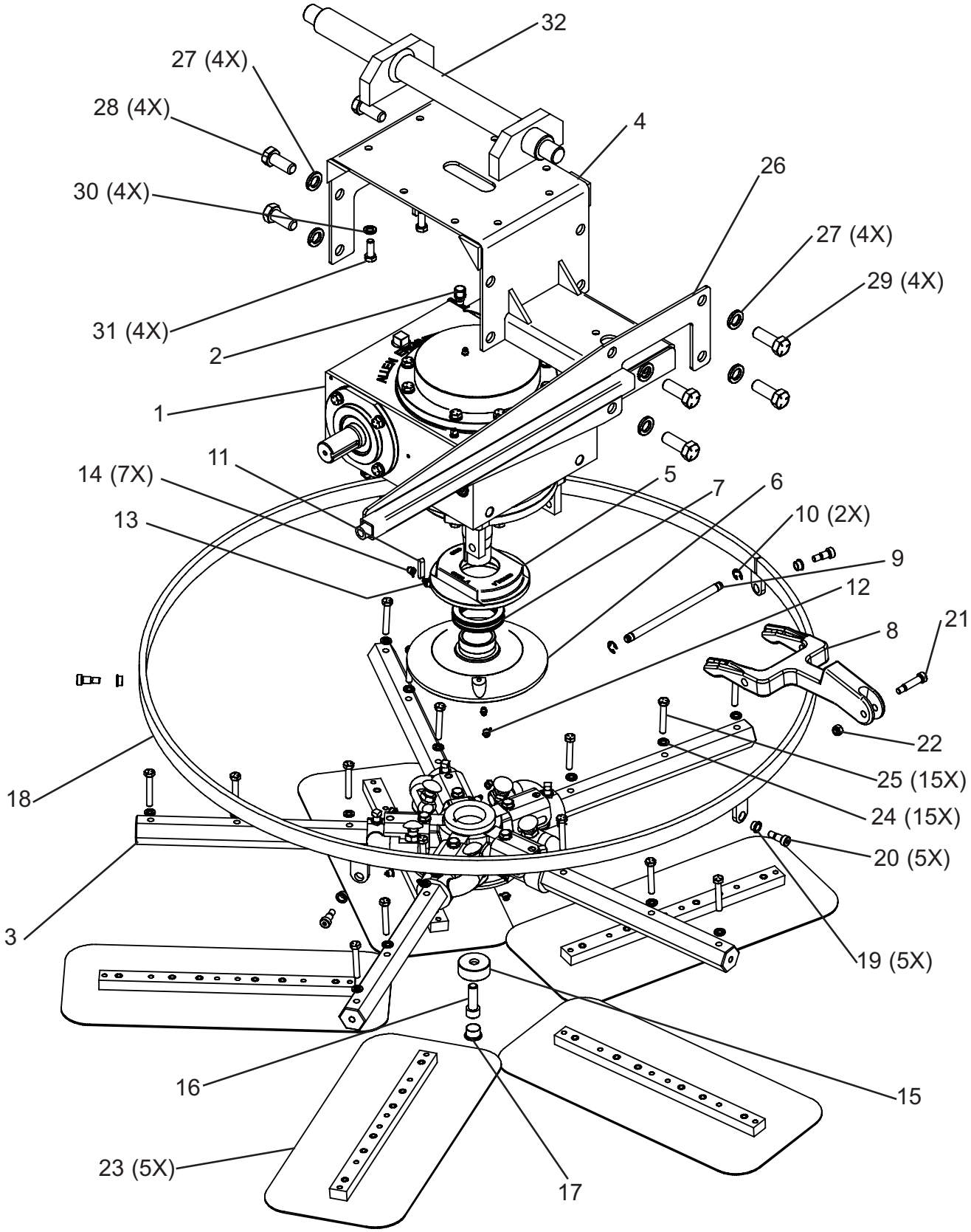
4.18 Parts List
Right Hand 20:1 Rotor Assembly

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	048957	ASSY, RH 20:1 ROTOR	(1)	REF
1	037655	GEARBOX, 20:1 RATIO RH	1	
2	029529	VALVE, RELIEF 1/8-27 NPT	1	
3	040795	ASSY, 5-SHD RH SOM SPIDER	1	
4	048881	MNT, CROSSHEAD GEARBOX	1	
5	039686	CAP, SHD PRESSURE PLATE	1	
6	039687	PLATE, SHD PRESSURE	1	
7	039685	BEARING, THRUST AXIAL BAL EW	1	
8	026215	ARM, YOKE	1	
9	015678	PIN, YOKE ARM	1	
10	015677	RING, Ø7/16 E-STYLE RETAINING	2	
11	015696	KEY, .25x1.25 LG HARD RAD	1	
12	010513	FITTING, 1/4-28 NPT STR GREASE	1	
13	201163	FITTING, 1/8-27 PTF STR GREASE	1	
14	015692	CAP, Ø1/4 RED GREASE	7	
15	037652	WASHER, HD RETAINING	1	
16	015691	SCREW, 1/2-13x1-1/2 RH SKT HD CAP	1	
17	015693	PLUG, PLASTIC CAP EC12	1	
18	040833	RING, 5 BLADE STABILIZER	1	
19	025092	BUSHING, 3/8x1/2x5/19 BRONZE	5	
20	025091	SCREW, 5/16-18x1/2xØ3/8x3/8 SHOULDER	5	
21	026504	SCREW, 5/16-18x1/2xØ3/8x1-1/4 SHOULDER	1	
22	012612	NUT, 5/16-18 NYLOCK HEX	1	
23	037532	BLADE, 8x18 FLAT FINISH GOLD	5	
24	010090	WASHER, SPLIT LOCK	15	
25	010024	SCREW, 5/16-18x2 GRADE 5 HEX HD CAP	15	
26	048875	ARM, RIGHT STEERING	1	
27	010095	WASHER, Ø5/16 ID ZINC SPLIT LOCK	8	
28	020915	SCREW, 5/16-11x1-1/2 HEX HD CAP	4	
29	019969	SCREW, 5/16x1-3/4 HEX HD CAP	4	
30	010091	WASHER, Ø3/8 ID ZINC SPLIT LOCK	4	
31	010036	SCREW, 3/8-16x1 HEX HD CAP	4	
32	048964	CROSSHEAD, 2-WAY	1	
33	048559	BAR, BEARING HOUSING ALUM	2	
34	048560	BEARING, I-GLIDE FLANGED T500	2	

NOTES:

1. Not shown.

4.19 Illustration
Left Hand 20:1 Rotor Assembly



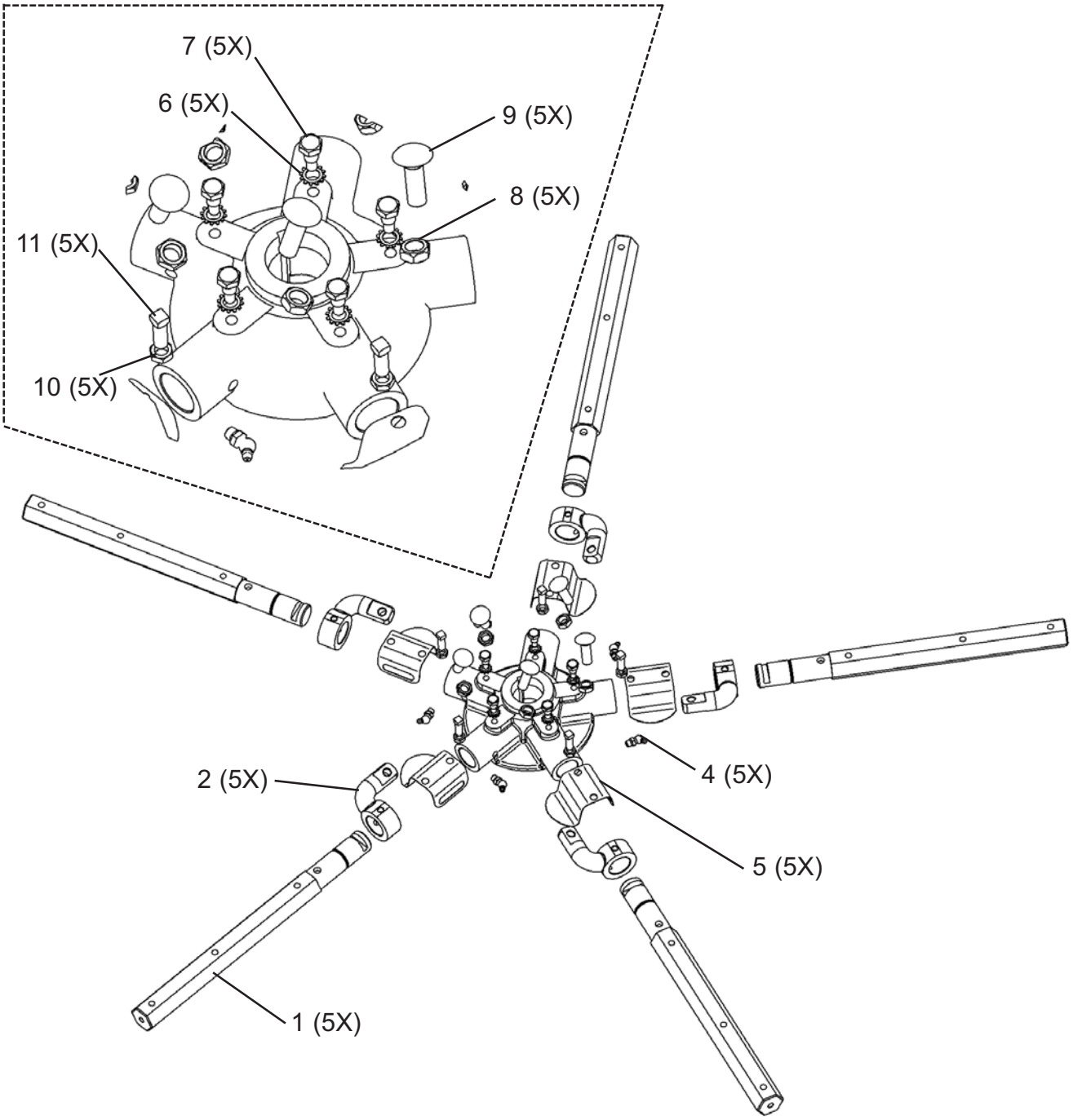
4.19 Parts List
Left Hand 20:1 Rotor Assembly

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	048956	ASSY, LH 20:1 ROTOR	(1)	REF
1	037654	GEARBOX, 20:1 RATIO LH	1	
2	029529	VALVE, RELIEF 1/8-27 NPT	1	
3	040794	ASSY, 5-SHD LH SOM SPIDER	1	
4	048881	MNT, CROSSHEAD GEARBOX	1	
5	039686	CAP, SHD PRESSURE PLATE	1	
6	039687	PLATE, SHD PRESSURE	1	
7	039685	BEARING, THRUST AXIAL BAL EW	1	
8	026215	ARM, YOKE	1	
9	015678	PIN, YOKE ARM	1	
10	015677	RING, Ø7/16 E-STYLE RETAINING	2	
11	015696	KEY, .25x1.25 LG HARD RAD	1	
12	010513	FITTING, 1/4-28 NPT STR GREASE	1	
13	201163	FITTING, 1/8-27 PTF STR GREASE	1	
14	015692	CAP, Ø1/4 RED GREASE	7	
15	037652	WASHER, HD RETAINING	1	
16	015691	SCREW, 1/2-13x1-1/2 RH SKT HD CAP	1	
17	015693	PLUG, PLASTIC CAP EC12	1	
18	040833	RING, 5 BLADE STABILIZER	1	
19	025092	BUSHING, 3/8x1/2x5/19 BRONZE	5	
20	025091	SCREW, 5/16-18x1/2xØ3/8x3/8 SHOULDER	5	
21	026504	SCREW, 5/16-18x1/2xØ3/8x1-1/4 SHOULDER	1	
22	012612	NUT, 5/16-18 NYLOCK HEX	1	
23	037532	BLADE, 8x18 FLAT FINISH GOLD	5	
24	010090	WASHER, SPLIT LOCK	15	
25	010024	SCREW, 5/16-18x2 GRADE 5 HEX HD CAP	15	
26	048876	ARM, LEFT STEERING	1	
27	010095	WASHER, Ø5/16 ID ZINC SPLIT LOCK	8	
28	020915	SCREW, 5/16-11x1-1/2 HEX HD CAP	4	
29	019969	SCREW, 5/16x1-3/4 HEX HD CAP	4	
30	010091	WASHER, Ø3/8 ID ZINC SPLIT LOCK	4	
31	010036	SCREW, 3/8-16x1 HEX HD CAP	4	
32	048966	CROSSHEAD, 2-WAY	1	

NOTES:

1. Not shown.

4.20 Illustration
Right Hand Spider Assembly

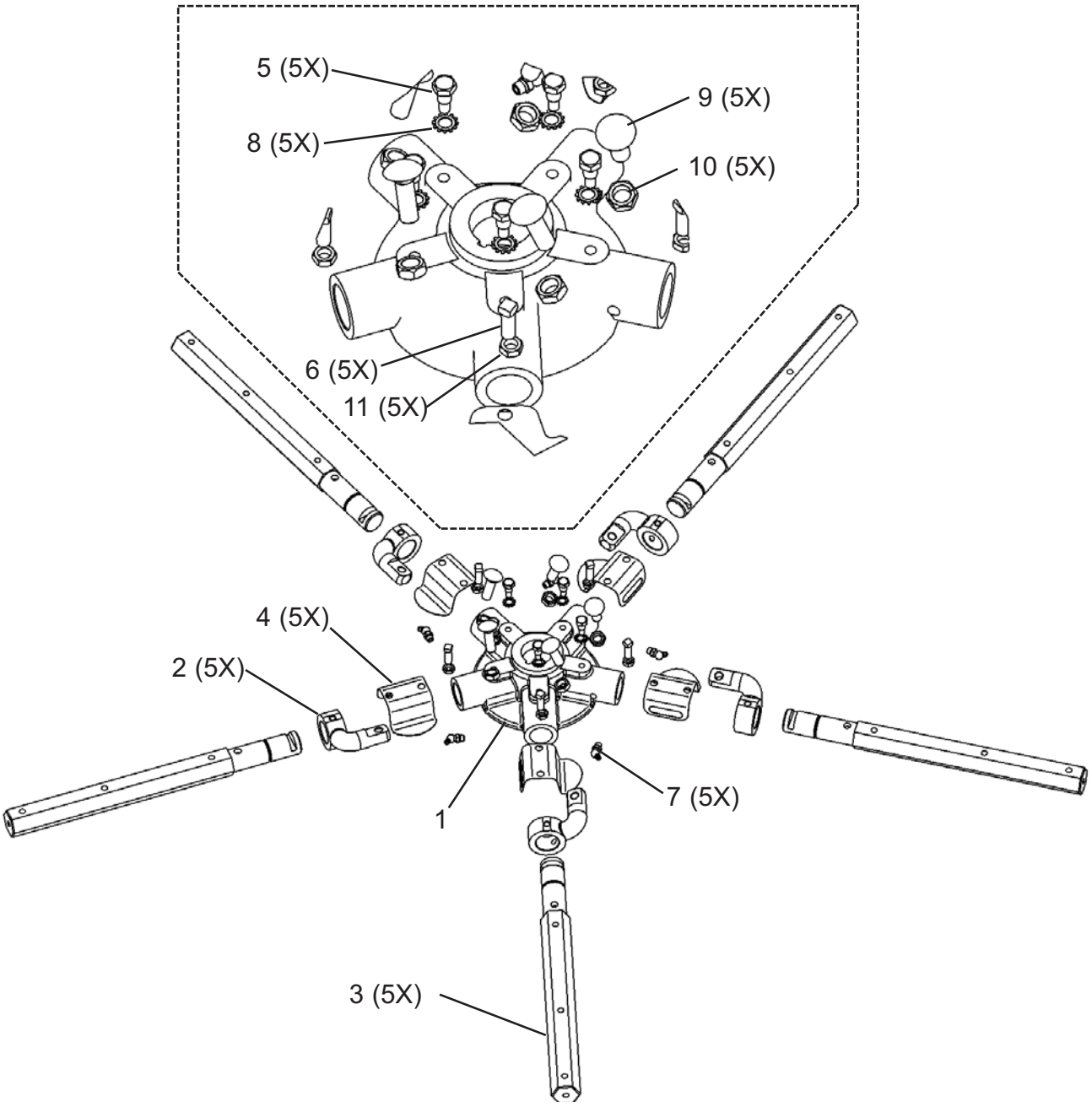


4.20 Parts List
Right Hand Spider Assembly

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	040795	ASSY, RIGHT HAND SPIDER	(1)	REF
1	040699	SPIDER, LH 5 BOSS CCW ROT	1	
2	033034	LEVER, LIFT SD UNIVERSAL	5	
3	040700	ARM, 5 BOSS SPIDER ASSY TROWEL	5	
4	024755	FITTING, 1/8-27 NPT 45° GREASE	5	
5	040792	CLIP, 46-48 UNIV SPIDER SPRING	5	
6	015682	WASHER, 3/8 EXTERNAL TOOTH LOCK	5	
7	015683	BOLT, 3/8-16x7/8 DOG POINT HEX HD CAP	5	
8	010050	NUT, 1/2-13 JAM HEX	5	
9	028216	BOLT, 1/2-13x1-1/2 GR 8 CARRIAGE	5	
10	015684	NUT, 3/8-16 JAM HEX	5	
11	015686	SCREW, 3/8-16x1 SQ HSS	5	

NOTES:
1. Not shown.

4.21 Illustration
Left Hand Spider Assembly

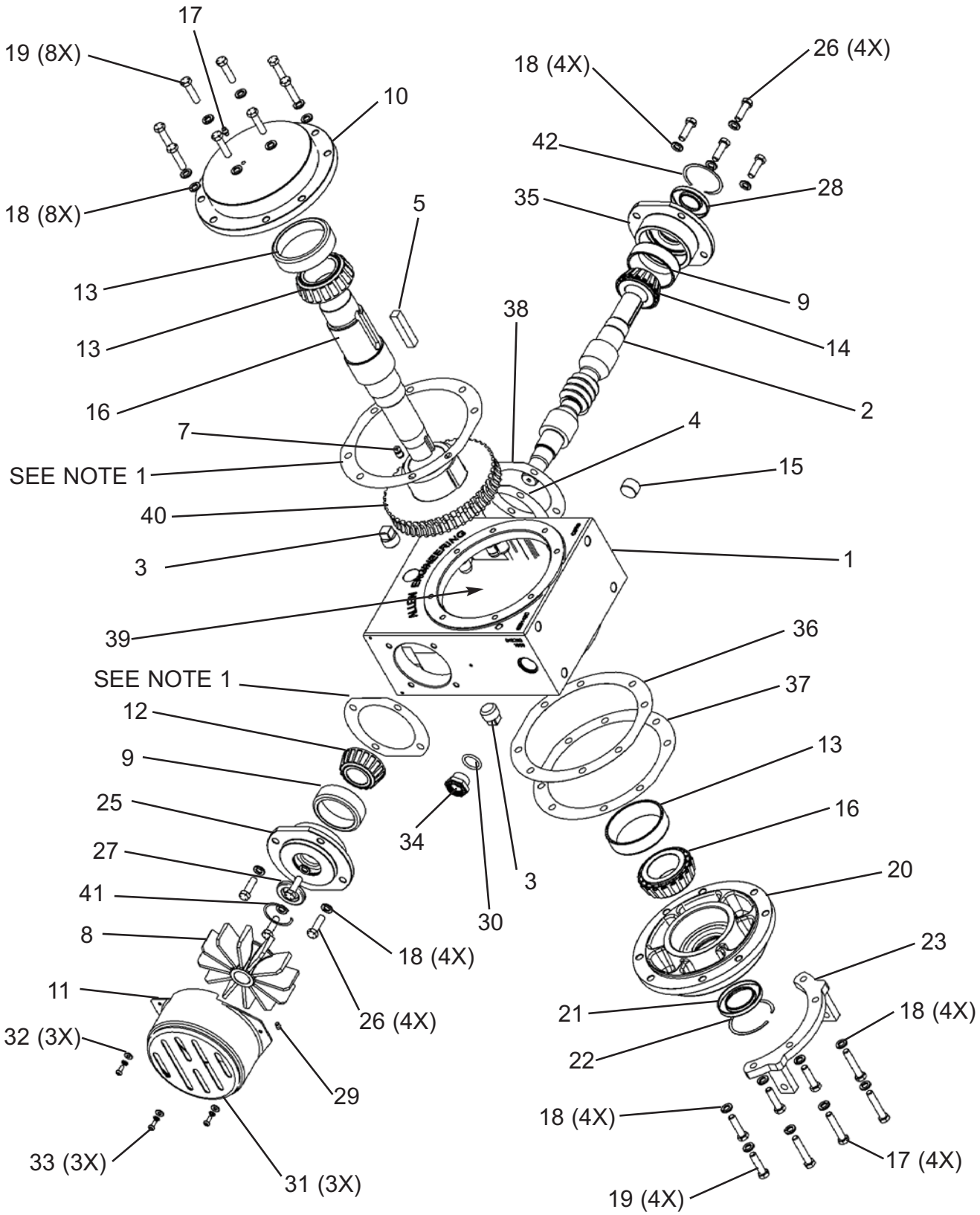


4.21 Parts List
Left Hand Spider Assembly

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	040794	ASSY, LEFT HAND SPIDER	(1)	REF
1	040698	SPIDER, RH 5 BOSS CW ROT 46-48	1	
2	033034	LEVER, LIFT SD UNIVERSAL	5	
3	040700	ARM, 5 BOSS SPIDER ASSY TROWEL	5	
4	040792	CLIP, 46-48 UNIV SPIDER SPRING	5	
5	015683	BOLT, 3/8-16x7/8 DOG POINT HEX HD CAP	5	
6	015686	SCREW, 3/8-16x1 SQ HHS	5	
7	024755	FITTING, 1/8-27 NPT 45° GREASE	5	
8	015682	WASHER, 3/8 EXTERNAL TOOTH LOCK	5	
9	028216	BOLT, 1/2-13x1-1/2 GR 8 CARRIAGE	5	
10	010050	NUT, 1/2-13 JAM HEX	5	
11	015684	NUT, 3/8-16 JAM HEX	5	

NOTES:
1. Not shown.

4.22 Illustration
RH 20:1 Super Heavy Duty Gearbox

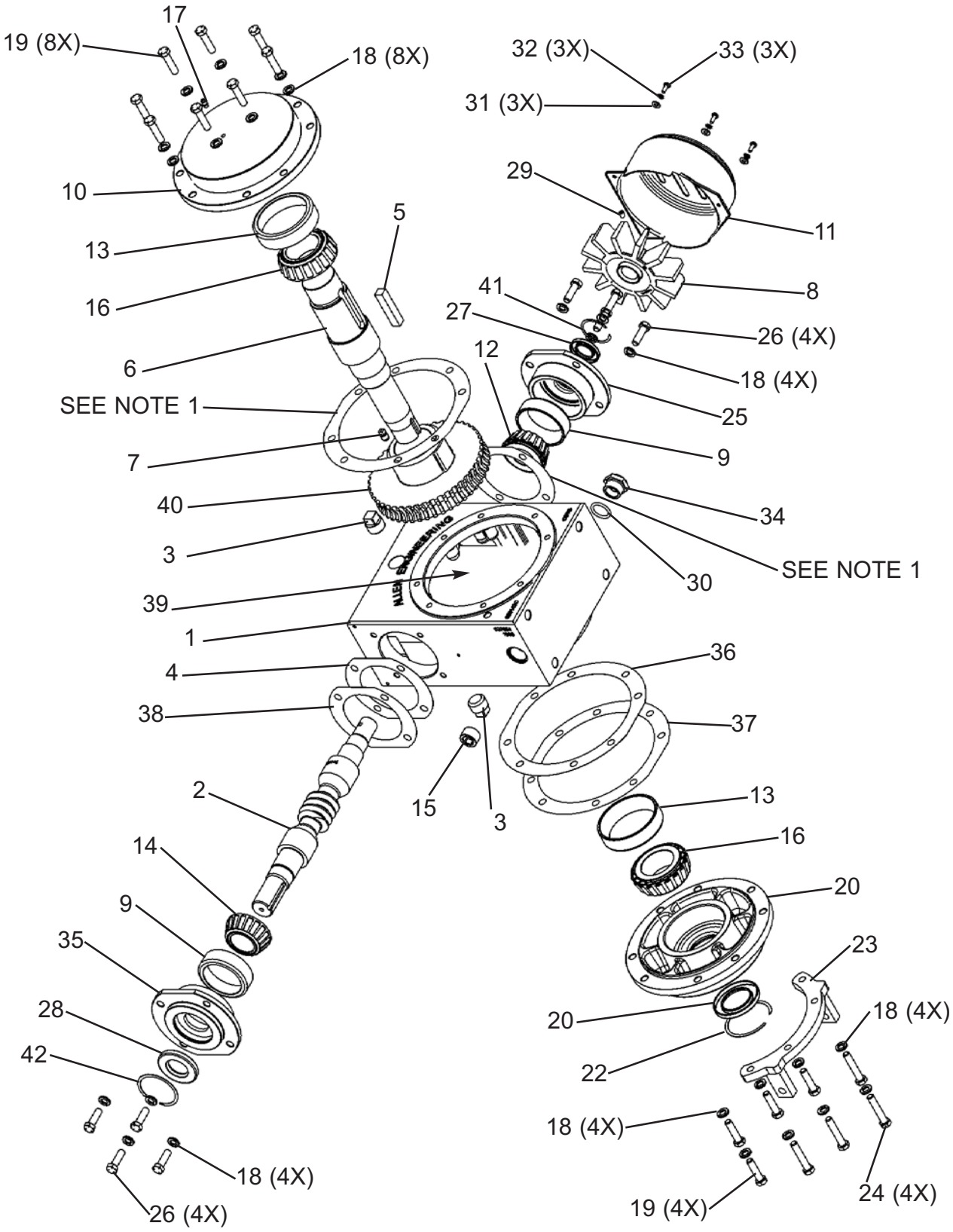


4.22 Parts List
RH 20:1 Super Heavy Duty Gearbox

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	037655	GEARBOX, RH SUPER HEAVY DUTY	(1)	REF
1	029143	CASE, SHD GEARBOX	1	
2	029144	SHAFT, COUNTER LH SHD	1	
3	012953	PLUG, 3/4 NPT BI SQ HD PIPE	2	
4	028915-10	SHIM, .010 LGE GEARBOX FLANGE	1	
5	029146	KEY, GEARBOX SQ 1/2x2.5	1	
6	037651	SHAFT, MAIN LH SHD GEARBOX	1	
7	032745	PLUG, 1/8 NPT RED POLTHN THD	1	
8	034541	FAN, SHD GEARBOX	1	
9	029272	CUP, Ø3 TPR ROLLER BEARING	2	
10	029150	CAP, SHD GEARBOX LARGE	1	
11	028703	SHROUD, FAN GEARBOX SHD	1	
12	029182	BEARING, Ø1.31 BORE TAPERED	1	
13	029184	CUP, Ø3-43/64 TRP ROLLER BEARING	2	
14	029178	BEARING, Ø1.43 BORE TAPERED	1	
15	035327	PLUG, 3/4-14 NPTF HOLLOW HEX	1	
16	029183	BEARING, Ø2 BORE TAPERED	2	
17	010513	FITTING, 1/4-28 NPT STR GREASE	1	
18	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
19	010038	BOLT, 3/8-16x1-1/2 GRADE 5 HEX HEAD CAP	12	
20	029155	CAP, BOTTOM GEARBOX SHD	1	
21	029180	SEAL, Ø1.875 RADIAL SHAFT OIL	1	
22	032715	RING, Ø2.875 RETAINING	1	
23	032716	BRACKET, SD GEARBOX	1	
24	026775	SCREW, 3/8-16x2 GRADE 8 HEX HEAD CAP	4	
25	029147	FLANGE, GEARBOX SHD	1	
26	010037	BOLT, 3/8-16x1-1/4 GRADE 5 HEX HEAD CAP	8	
27	029181	SEAL, Ø1.125 RADIAL SHAFT OIL	1	
28	029179	SEAL, Ø1.375 RADIAL SHAFT OIL	1	
29	012869	SCREW, 1/4-20x3/8 BO SKT SET	1	
30	015673	O-RING, 15/16x1-3/16x1/8 BUNA	1	
31	018072	WASHER, NO. 10 Z-STL SAE FLAT	3	
32	013740	WASHER, NO. 10 EXTERNAL-TOOTH LOCK	3	
33	013484	SCREW, 10-24x1/2 ROUND PHILLIPS HEAD	3	
34	015672	GAUGE, 3/4-14 NPT PORTHOLE VIEW	1	
35	026154	CAP, SHD GEARBOX END	1	
36	028914-10	SHIM, .010 LARGE GEARBOX COVER	1	
37	028914-2	SHIM, .002 LARGE GEARBOX COVER	1	
38	028915-5	SHIM, .005 LARGE GEARBOX FLANGE	1	
39	001004	OIL, ALLEN MOBIL SHC 634 GEAR	0.75	2
40	029148	GEAR, 20:1 LH BRONZE	1	
41	032713	RING, Ø1.827 RETAINING	1	
42	032714	RING, Ø2.478 RETAINING	1	

NOTES:
1. These shim thicknesses are established at the factory, call customer service for the appropriate replacement size.
2. QTY (U/M) is indicated by gallons.

4.23 Illustration
LH 20:1 Super Heavy Duty Gearbox

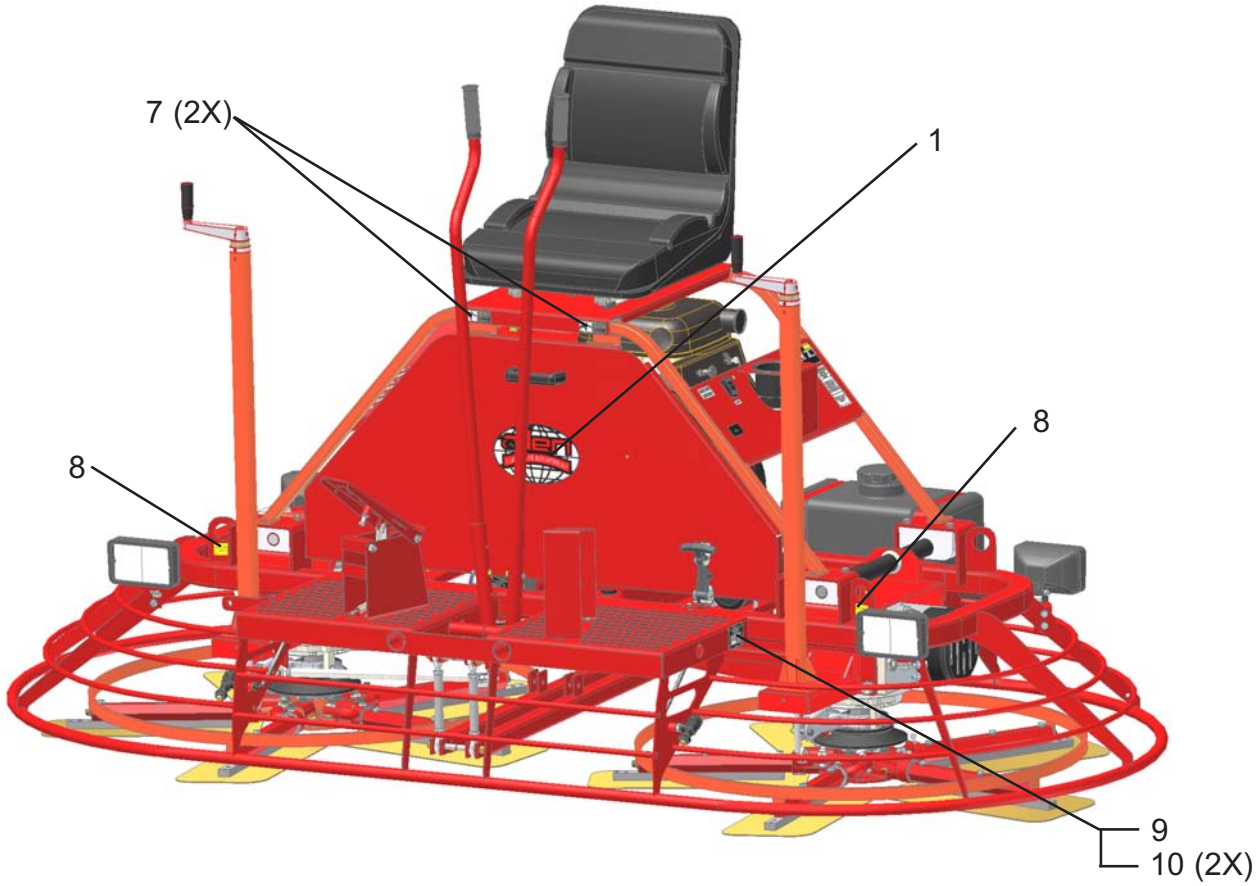


4.23 Parts List
LH 20:1 Super Heavy Duty Gearbox

REF	PART NO.	DESCRIPTION	QTY	NOTES
-	037654	GEARBOX, LH SUPER HEAVY DUTY	(1)	REF
1	029143	CASE, SHD GEARBOX	1	
2	029145	SHAFT, COUNTER RH SHD	1	
3	012953	PLUG, 3/4 NPT BI SQ HD PIPE	2	
4	028915-10	SHIM, .010 LGE GEARBOX FLANGE	1	
5	029146	KEY, GEARBOX SQ 1/2x2.5	1	
6	037650	SHAFT, MAIN RH SHD GEARBOX	1	
7	032745	PLUG, 1/8 NPT RED POLTHN THD	1	
8	034541	FAN, SHD GEARBOX	1	
9	029272	CUP, Ø3 TPR ROLLER BEARING	2	
10	029150	CAP, SHD GEARBOX LARGE	1	
11	028703	SHROUD, FAN GEARBOX SHD	1	
12	029182	BEARING, Ø1.31 BORE TAPERED	1	
13	029184	CUP, Ø3-43/64 TRP ROLLER BEARING	2	
14	029178	BEARING, Ø1.43 BORE TAPERED	1	
15	035327	PLUG, 3/4-14 NPTF HOLLOW HEX	1	
16	029183	BEARING, Ø2 BORE TAPERED	2	
17	010513	FITTING, 1/4-28 NPT STR GREASE	1	
18	010091	WASHER, Ø3/8 ID Z-STL SPLIT LOCK	24	
19	010038	BOLT, 3/8-16x1-1/2 GRADE 5 HEX HEAD CAP	12	
20	029155	CAP, BOTTOM GEARBOX SHD	1	
21	029180	SEAL, Ø1.875 RADIAL SHAFT OIL	1	
22	032715	RING, Ø2.875 RETAINING	1	
23	032716	BRACKET, SD GEARBOX	1	
24	026775	SCREW, 3/8-16x2 GRADE 8 HEX HEAD CAP	4	
25	029147	FLANGE, GEARBOX SHD	1	
26	010037	BOLT, 3/8-16x1-1/4 GRADE 5 HEX HEAD CAP	8	
27	029181	SEAL, Ø1.125 RADIAL SHAFT OIL	1	
28	029179	SEAL, Ø1.375 RADIAL SHAFT OIL	1	
29	012869	SCREW, 1/4-20x3/8 BO SKT SET	1	
30	015673	O-RING, 15/16x1-3/16x1/8 BUNA	1	
31	018072	WASHER, NO. 10 Z-STL SAE FLAT	3	
32	013740	WASHER, NO. 10 EXTERNAL-TOOTH LOCK	3	
33	013484	SCREW, 10-24x1/2 ROUND PHILLIPS HEAD	3	
34	015672	GAUGE, 3/4-14 NPT PORTHOLE VIEW	1	
35	026154	CAP, SHD GEARBOX END	1	
36	028914-10	SHIM, .010 LARGE GEARBOX COVER	1	
37	028914-2	SHIM, .002 LARGE GEARBOX COVER	1	
38	028915-5	SHIM, .005 LARGE GEARBOX FLANGE	1	
39	001004	OIL, ALLEN MOBIL SHC 634 GEAR	0.75	2
40	029149	GEAR, 20:1 RH BRONZE	1	
41	032713	RING, Ø1.827 RETAINING	1	
42	032714	RING, Ø2.478 RETAINING	1	

NOTES:
1. These shim thicknesses are established at the factory, call customer service for the appropriate replacement size.
2. QTY (U/M) is indicated by gallons.

4.24 Illustration, Front View Identification and Marking Decals



4.24 Parts List, Front View Identification and Marking Decals

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	048036	DECAL, ACE LARGE OVAL	1	
2	032377	DECAL, PITCH CONTROL	2	1
3	034876	DECAL, LIGHTS	1	
4	048181	DECAL, CALIFORNIA PRPSTN 65 WARNING	1	
5	039048	DECAL, GENERAL PROTECTION WARNING	1	
6	039778	DECAL, GREASE THRUST BEARING	1	
7	028787	DECAL, CAUTION PINCH POINT	2	
8	032159	DECAL, LIFT HERE ONLY	2	
9	032097	DECAL, SERIAL NUMBER PLATE	1	
10	012994	RIVET, 1/8x3/8 ALUM DOME HEAD	4	

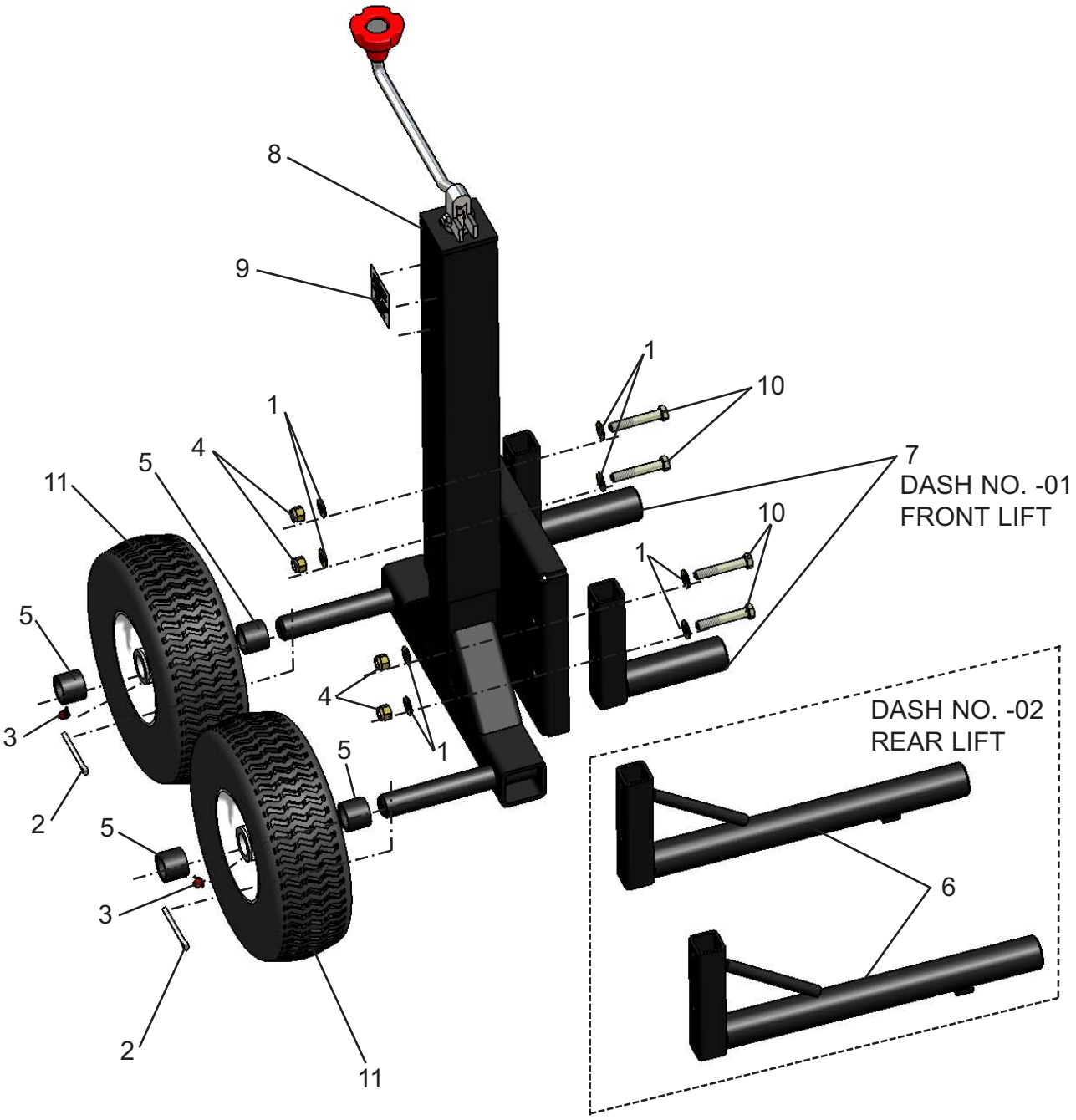
NOTES:
1. Not shown.

4.25 Parts List, Rear View Identification and Marking Decals

REF	PART NO.	DESCRIPTION	QTY	NOTES
1	048046	DECAL, MSP415 MECHNICAL DRIVE LOGO	1	
2	048037	DECAL, ACE SMALL OVAL	1	
3	048937	DECAL, MFGR BY ALLEN ENGR	1	1
4	039778	DECAL, GREASE THRUST BEARING	2	1
5	041662	DECAL, AMERICAN MADED AND OWNED	1	1
6	032159	DECAL, LIFT HERE ONLY	2	
7	048448	DECAL, RIDING TROWEL PATENT NUMBERS	1	
8	032896	DECAL, “MADE IN USA”	1	1
9	047878	DECAL, BELT CONTAMINATION CAUTION	2	1
10	048340	DECAL, ALLEN ENGR GEARBOX OIL	2	1
11	019426	DECAL, GASOLINE ONLY	1	
12	036767	DECAL, RETARDANT ONLY	1	
13	039049	DECAL, MUFFLER GUARD	1	

NOTES:
1. Not shown.

4.26 Illustration
Accessory - Pro Dolly Jack System



4.26 Parts List
Accessory - Pro Dolly Jack System

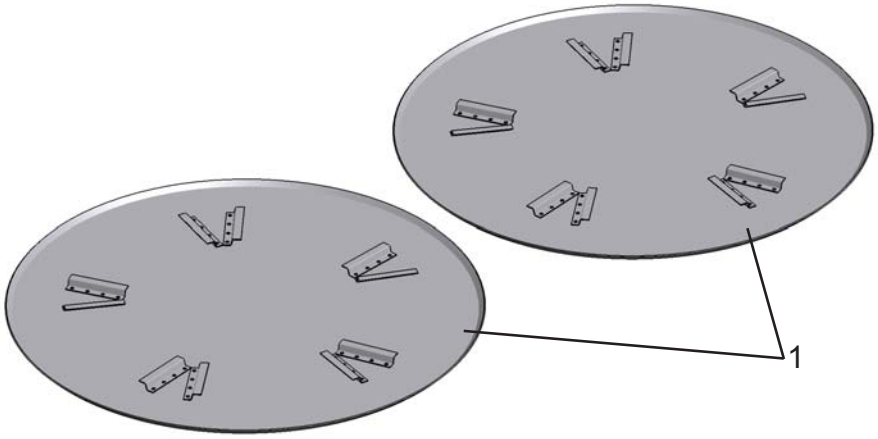
REF	PART NO.	DESCRIPTION	QTY	NOTES
-	027684	SET, PRO DOLLY JACK	1	REF
1	017751	WASHER, 3/8 FLAT	16	
2	010133	PIN, 3/16 X 2 COTTER	4	
3	015692	CAP, 1/4 RED GREASE	4	
4	010464	NUT, 3/8-16 NYLOCK LOCK	8	
5	024628	SPACER, DOLLY JACK WHEEL	8	
6	026728	ASSEMBLY, REAR DOLLEY TUBE [DASH NO. -02]	2	
7	026729	ASSEMBLY, DOLLY JACK TUBE [DASH NO. -01]	2	
8	026938	JACK, DOLLY	2	
9	039633	DECAL, DOLLY JACK SYSTEM	2	
10	040637	SCREW, 3/8-16 X 2-1/4 GRADE 8 HEX HD CAP	8	
11	099014	ASSEMBLY, PNEUMATIC TIRE AND WHEEL	4	

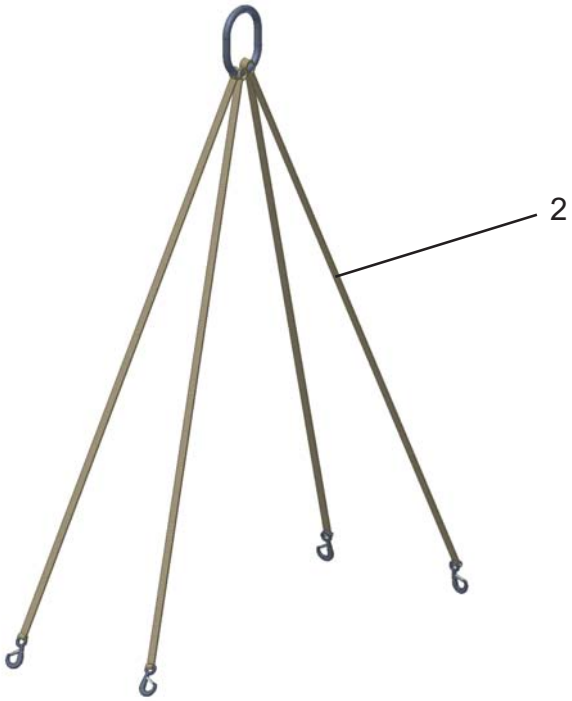
NOTES:

1. Not shown.

2. NOTE: Quantity values called out in QTY column above are for the set total. Dash -01 (REF NO. 6) and Dash -02 (REF NO. 7) required only half the value callout respectively.

4.27 Illustration
Accessory - Non-standard Items



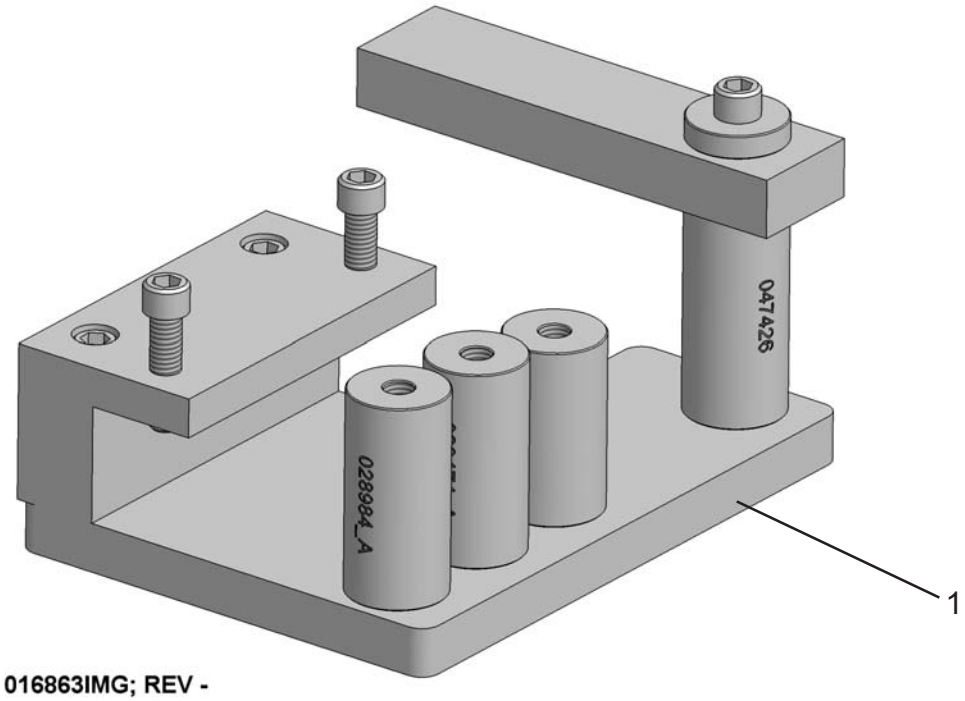


4.27 Parts List
Accessory - Non-standard Items

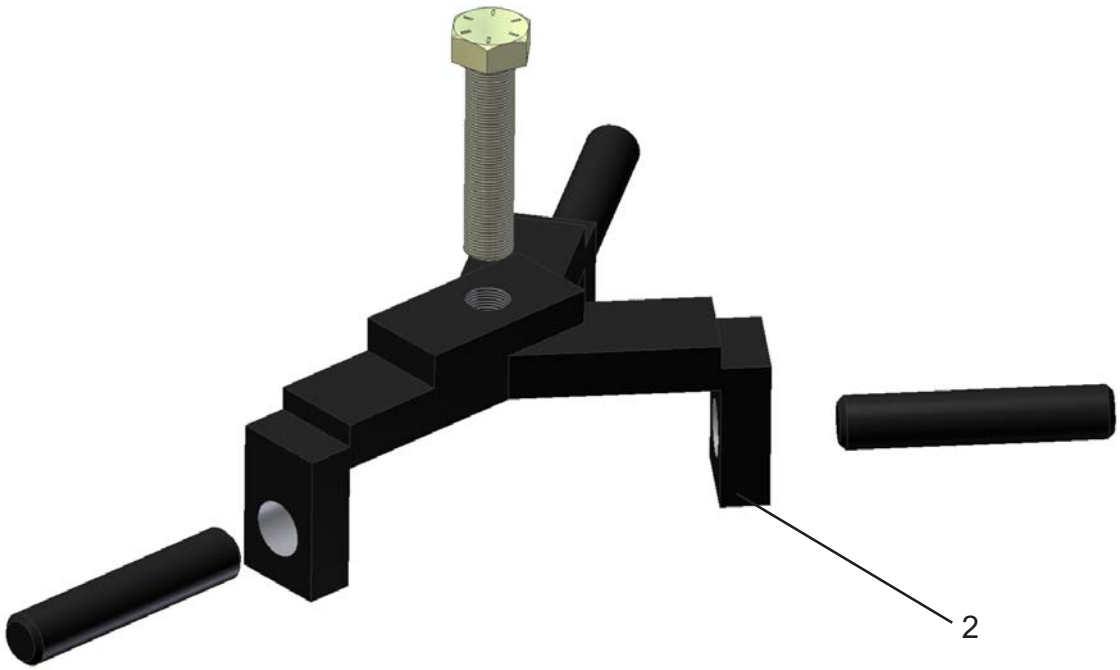
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	040904-2	DISC, 1200-5 FLOATING (PAN)	2	
2	035461	BRIDLE, 2500 LB 5 FT SLING LIFT	1	

NOTES:
1. Not shown.

4.28 Illustration
Tools - Service



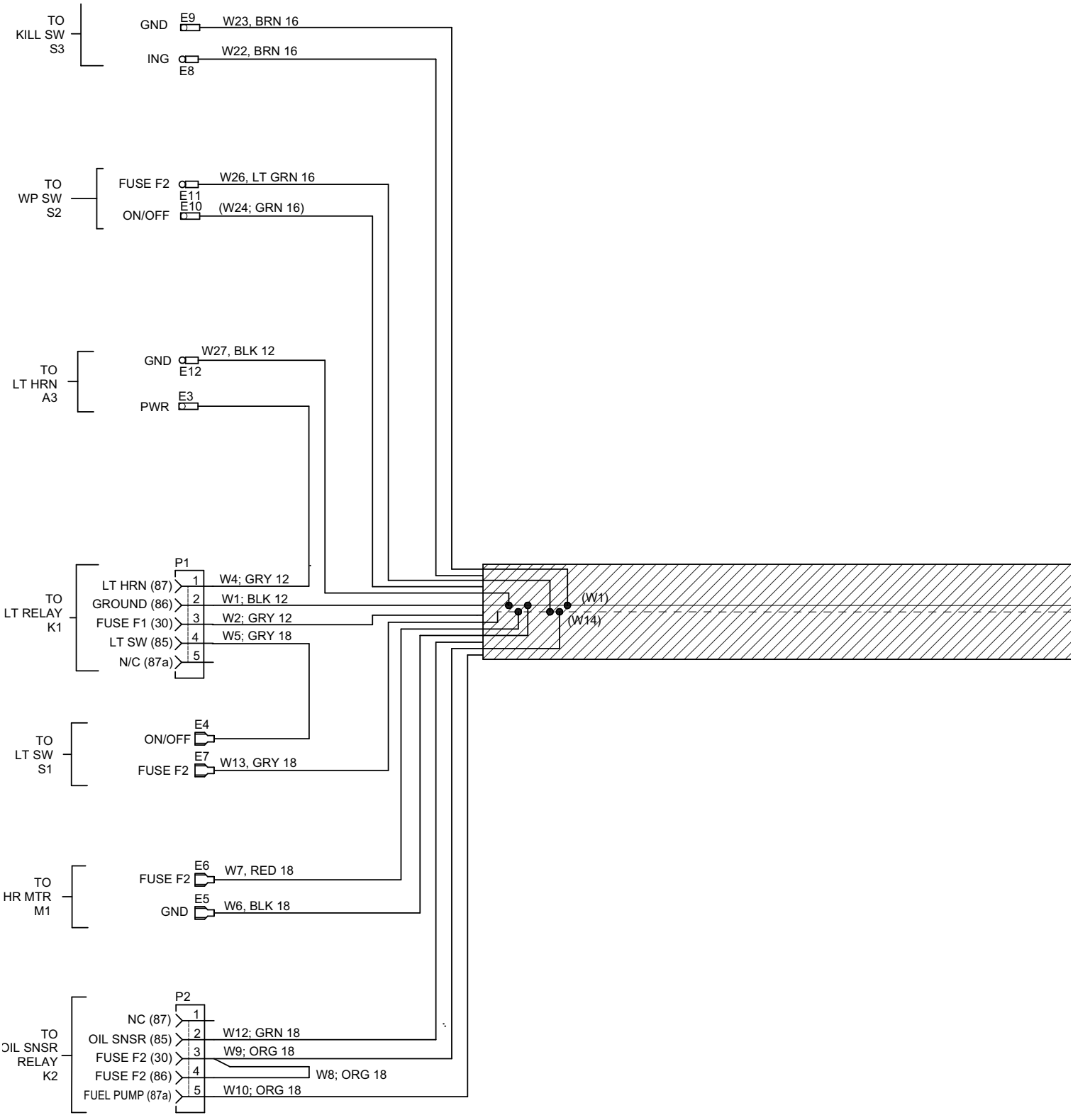
016863IMG; REV -



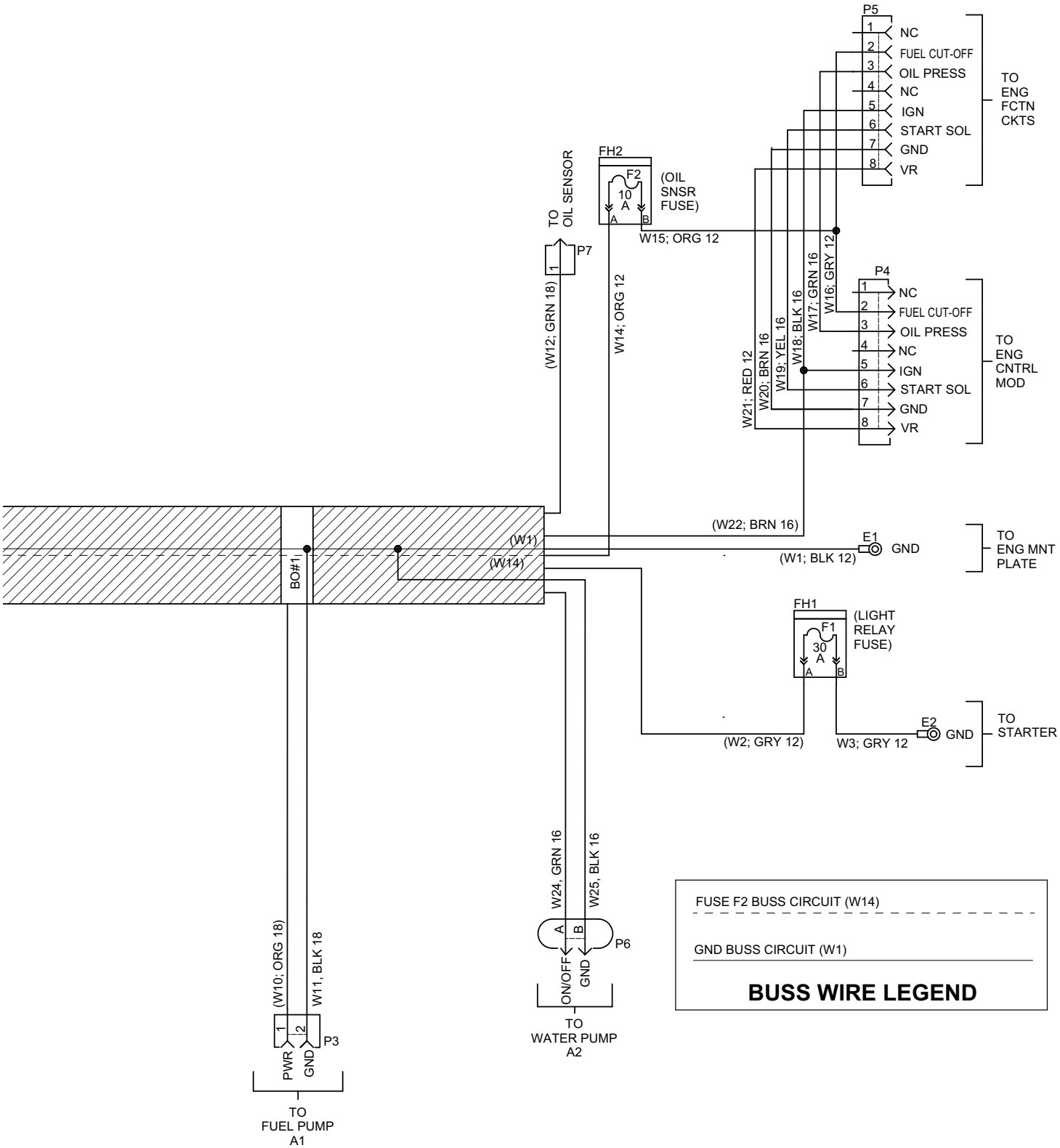
REF	PART NO.	DESCRIPTION	QTY	NOTES
1	016863	JIG, TROWEL ARM ALIGNMENT	1	
2	045399	PULLER, SHD 5-ARM SPIDER	1	

NOTES:
1. Not shown.

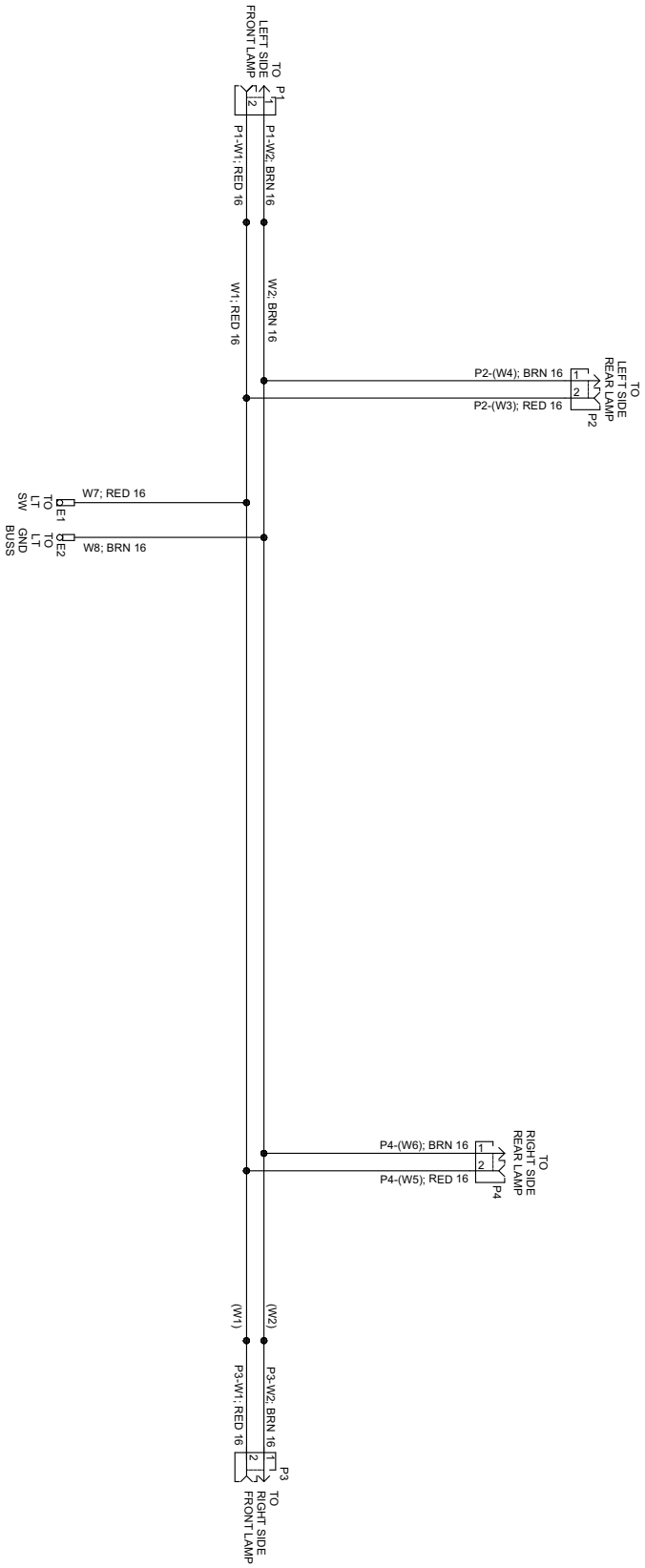
4.29 Illustration
Power/Control Electrical Schematic



4.29 Illustration, continued
Power/Control Electrical Schematic



4.30 Illustration
Work Lamp Electrical Schematic



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